ASM REVIEW OF METAL LITERATURE

1956

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REVIEW OF METAL LITERATURE

An Annotated Survey of Articles and Technical Papers Appearing in the Engineering, Scientific and Industrial Journals and Books, Here and Abroad, Prepared by the Technical Information Division of Battelle Memorial Institute, Columbus, Ohio.

Volume 13

1956

MARJORIE R. HYSLOP, *Editor*

Published by
AMERICAN SOCIETY FOR METALS
CLEVELAND 3, OHIO

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LITHOPRINTED IN THE UNITED STATES OF AMERICA BY
CUSHING - MALLOY, INC., ANN ARBOR, MICHIGAN, 1957

PREFACE

The A.S.M. Review of Metal Literature is a monthly feature of *Metals Review*, published by the American Society for Metals and distributed to its members. The present volume is a collection of the installments published in *Metals Review* from January through December 1956. It is the thirteenth volume in a series that began in 1944.

The annotations are not intended to serve as a substitute for a reading of the articles listed. They are brief abstracts designed to indicate the scope and content of the article so that the reader may determine whether it is something he wants to read in its entirety. In other words, they are indicative rather than informative abstracts.

The method of classifying the annotations into subject subdivisions is based upon the "ASM-SLA Metallurgical Literature Classification," designed by a joint committee of the American Society for Metals and the Special Libraries Association, and published by the American Society for Metals in 1950.

The table of contents lists the main headings into which the A.S.M. Review of Metal Literature is subdivided, together with secondary subdivisions indicating the scope of the main heading. The main sections are designated by capital letters, and individual annotations are identified by the appropriate capital letter preceded by a serial number. Each annotation in the text of the book is likewise followed by code symbols which refer to these main subdivisions, together with numerals which refer to subdivisions of the main classifications as listed in the table of contents. These numerals refer to the coding system used in the "ASM-SLA Metallurgical Literature Classification." For example, the symbol "C21" in parentheses at the end of an annotation indicates that the literature reference has to do with "Nonferrous Smelting and Refining" (C), and, specifically, "Smelting" (21).

The main divisions of the classification refer primarily to "processes and properties," with a final section "V" to include literature references dealing with specific materials and covering various processes and properties in a broad and general way. Materials are likewise coded by symbol at the end of each annotation. Chemical symbols of the elements are used to code metals and alloys. In addition, various materials groups are coded. For example, "EG" plus a lower-case letter refers to an "Element Group," "SG" to "Special Groups," and various combinations of capital letters indicate types of steels and cast irons. For example the symbol "C21" might be followed by the symbol "Cu," written "(C21, Cu)" and

indicating that the reference had to do with smelting of copper alloys. This coding system is explained in detail in the ASM-SLA Metallurgical Literature Classification.

An understanding of this coding system, however, is not essential to the use of this volume of the Review of Metal Literature, which is accompanied by a complete subject index starting on page 791. Since the annotations are classified primarily by processes and properties, the subject index has been prepared with the emphasis primarily on materials. Subheads and cross-references are included in sufficient detail to permit the location of articles on any specific subject related to the metal industry. Indexing is based on the content of the article and not merely on the title.

In using the book, if the primary interest is in the broad field of corrosion, or foundry practice, or heat treatment, turn immediately to the respective section as given in the table of contents. If the main interest is in aluminum alloys, or copper, or cast iron, turn to the corresponding heading in the subject index. If interest lies in specific aspects of foundry practices, or a particular type of heat treatment, these broad processes will be found broken down and subdivided in the subject index. An author index is also provided and a list of addresses of the journals and periodicals from which the literature references are taken.

The annotations have been prepared by the technical abstractors and translators of the Technical Information Division of Battelle Memorial Institute.

Marjorie R. Hyslop
Editor

May 1, 1957

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SECTION A

GENERAL METALLURGICAL

1-A. The Tin Research Institute. E. S. Hedges. *Laboratory Practice,* v. 4, Oct. 1955, p. 422-427.

Locates divisions and laboratories throughout the world and explains some of work done to develop consumption. Photographs. (A9, T general, Sn)

2-A. Etruscan Metallurgy. Aldo Neppi Modona. *Scientific American,* v. 193, Nov. 1955, p. 90-94, 96, 98.

Archaeological studies to determine composition and properties of ancient bronze and other ancient metal articles. Photographs, map. (A2, Cu)

3-A. (German.) **The Light Metals in Competition With Steel.** Paul Brenner. *Stahl und Eisen,* v. 75, no. 21, Oct. 20, 1955, p. 1364-1375.

Compares physical, mechanical and chemical characteristics, uses and methods of joining. Graphs, tables, diagrams, photographs. (A general, EG-a, ST)

4-A. Safety in Foundries. C. Starkey. *Machinery Lloyd (Overseas Ed.),* v. 27, Nov. 5, 1955, p. 87-89.

Ways to prevent dermatitis. (A7, E general)

5-A. Instrumentation in the Disposal of Finishing Wastes. A. Linford. *Electroplating and Metal Finishing,* v. 8, Nov. 1955, p. 384-388.

Fundamental problems connected with the dispcsal and treatment of effluents. Methods for controlling rate of flow and pH of the effluent. Diagram, photographs. (A8, L general)

6-A. Ion Exchange Materials in the Metallurgical Industries. T. R. E. Kressman. *Institute of Metal Finishing, Transactions,* v. 30, 1954, p. 87-94.

Modern ion exchange resins are suitable for use in the metallurgical industries for the removal of cations from chromic acid anodizing baths, for the removal of iron from phosphoric acid pickling baths and for the removal of the metals and chromic acid from plating and anodizing waste waters. 5 ref. (A8, L17, L19)

7-A. ODM to Continue to Defer Stockpile Shipments of Certain Metals to Help Domestic Consumers. Arthur S. Flemming. *Metals (Daily Metal Reporter Monthly Supplement),* v. 26, Nov. 1955, p. 7-8, 11.

Seventy-five materials valued at $9.6 billion are now being stockpiled. Once materials are stockpiled they cannot enter the civilian market without Presidential proclamation. (A4)

8-A. Doubts Die Casters' Aluminum Needs in 1956-57 Can Be Met Under Present Marketing Conditions. David Laine. *Metals (Daily Metal Reporter Monthly Supplement),* v. 26, Nov. 1955, p. 9-10.

Supply shortage of aluminum ingot is foreseen in 1957. Consumption in 1955 will be 400-million lb. with 450-million lb. required in 1956. (A4, E13, Al)

9-A. A Dictionary of Metallurgy. A. D. Merriman and J. S. Bowden. *Metal Treatment and Drop Forging,* v. 22, Nov. 1955, p. 465-472.

Defines "reversed bronze" through "roentgen." Diagrams, graphs. (To be continued.) (A10)

10-A. Life Begins at Forty. Leland I. Doan. *Modern Metals,* v. 11, Nov. 1955, p. 88-91.

The president of Dow Chemical Co. predicts a bright future for magnesium. He cites technical gains, big civilian uses, availability of the metal. (A4, Mg)

11-A. Aluminum Shortage Until '57. *Steel,* v. 137, Nov. 28, 1955, p. 68.

Comparison of projected requirements and production capacity. Photograph. (A4, Al)

12-A. Western Steel Needs Rise. *Steel,* v. 137, Nov. 28, 1955, p. 71.

Survey of Western steel markets

for the years 1951 to 1954. Table. (A4, ST)

13-A. Economics of Oxygen Steelmaking. *Steel,* v. 137, Nov. 21, 1955, p. 100, 103, 106.

Compares costs of oxygen and openhearth steel making. Photographs. (A4, D2, D8)

14-A. Controlling Climate Effects to Meet Industry Needs. Lawrence E. Doyle and Ronald D. Lemon. *Tool Engineer,* v. 35, Dec. 1955, p. 113-120.

Answers to climatic problems which could arise in metalworking plants. Tables, graph, maps, 1 ref. (A5)

15-A. United Nations Quarterly Bulletin of Steel Statistics for Europe, v. 6, no. 3, Sept. 1955, 123 p.

Tables of production, consumption of raw materials, foreign trade and deliveries of steel to industries for iron products, iron ore, coke, pig iron and crude steel. Tables. (A4, Fe, ST)

16-A. Industrial Hygiene and Safety. E. C. Barnes. Paper from "The Metallurgy of Zirconium". National Nuclear Energy Series, Division VII—v. IV. McGraw-Hill Book Co., p. 733-741.

Explosion hazards, shipment techniques, toxicity. 15 ref. (A7, A5, Zr)

17-A. (German.) **Steel Industry. Iron Production and Steel Manufacturing.** G. Bulle. *VDI Zeitschrift,* v. 97, no. 31, Nov. 1, 1955, p. 1111-1121.

Annual review of iron and steel production in U.S.A. and Germany, mentioning innovations in the fields. Tables, graphs, diagrams, photograph. 18 ref. (A4, D general, Fe, ST)

18-A. (German.) **Rolling Mills.** H. Sedlaczek. *VDI Zeitschrift,* v. 97, no. 31, Nov. 1, 1955, p. 1121-1125.

Review of world production of rolling mills with corresponding figures and references. 100 ref. (A4, F23, ST)

19-A. (Book.) **Chemical Trade Names and Commercial Synonyms.** William Haynes. 2nd Rev. Ed. 466 p. 1955. D. Van Nostrand Co., 120 Alexander St., Princeton, N. J. $8.00.

Contains a key to manufacturers (with addresses), and trade names and symbols defined by their composition and uses. (A10)

20-A. (Book.) **Metals Handbook—1955 Supplement.** Taylor Lyman, editor. 208 p. American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. $6.00.

First published and abstracted as the Aug. 1955 issue of *Metal Progress.* Covers design and applications, processing and fabrication, and testing and inspection. (A general)

21-A. (Book.) **Industrial & Manufacturing Chemistry. Pt. II. Inorganic.** Geoffrey Martin. 6th Ed. (Revised by Wilfrid Francis.) v. II. 491 p. 1955. Philosophical Library, Inc., 15 East 40th St., New York 16, N. Y.

Brief review of manufacture and processing of chemicals, cements, ceramic ware, abrasives, and nonferrous metals. Pertinent papers abstracted individually. (A general, EG-a)

22-A. (Book.) **Problems and Control of Air Pollution.** Frederick S. Mallette, editor. 272 p. 1955. Reinhold Publishing Corp., 330 W. 42nd St., New York 36, N. Y.

Comprehensive treatment of the aspects which contribute to the lack of knowledge relating to biological and health implications, meteorological problems, control patterns and research, and pollutant identification and distribution; current developments; treatment and recovery of sulfur dioxide; pollution problems and experiences abroad. (A7, A8)

23-A. (Book.) **Safety in Industry.** D. I. Macfarlane. 71 p. 1955. Philosophical Library, Inc., 15 East 40th Street, New York 16, N. Y. $6.00.

Dust and fume control, rotating machinery and press guards, dermatitis control, eye protection, ionizing radiations, protective clothing, lighting, and flooring are discussed as they pertain to personnel protection. (A7)

24-A. Survey of Scrap Preparation in Steel Plants. *American Iron and Steel Institute, Contributions to the Metallurgy of Steel,* no. 48, 1955, 44 p.

Information obtained from questionnaires from 56 steel plants. Tables. (A8, ST)

25-A. Russian Iron and Steel Industry. Robert Shone and W. F. Cartwright. *Iron & Steel,* v. 28, Dec. 1955, p. 655-659.

Productivity and incentives, raw materials and plant equipment. (A general, B10, ST)

26-A. Evaluation of a Waste Pickle Liquor Treatment. T. F. Barnhart. *Iron and Steel Engineer,* v. 32, Dec. 1955, p. 62-65.

New process permits recovery of inhibitors and of the liquor as reusable sulfuric acid, allows use of its only byproduct; iron oxide, by the steel plants. Tables, diagrams. (A8, L12)

27-A. Handling Bulk Materials in Steel Plants. A. H. Andrews. *Iron and Steel Engineer,* v. 32, Dec. 1955, p. 72-82; disc., p. 82-84.

Methods and equipment used to transport and move ore, coal and similar bulk materials. Photographs. (A5, ST)

28-A. Scrap Preparation and Contamination. R. F. Kuhnlein. *Iron and Steel Engineer,* v. 32, Dec. 1955, p. 120-123.

Some problems of scrap contamination and methods for eliminating contaminants. (A8, ST)

29-A. The Increasing Importance of Glass in the Metal Working Industries. *Machinery (London),* v. 87, Dec. 2, 1955, p. 1279, 1328.

Brief survey of aplications of glass in structures, jigs and molds. Use of glass as a lubricant in forging and extrusion operations. (A general, F1, G general)

30-A. Metalworking Facts for 1956. *American Machinist (1956 Production Planbook Issue),* v. 99, Mid-Nov. 1955, p. 1A-16A.

Outlook for the year, based on facts and predictions, regarding expenditures, production, exports, equipment, wages and prices and employment. Graph, tables. (A4)

31-A. Zirconium Metal Fines Recovery. Low Hafnium Zirconium Project. S. C. Ogburn, Jr., and L. J. Reader. *Foote Mineral Company (U. S. Atomic Energy Commission),* NYO 1093, Jan. 1951, 15 p.

Laboratory and pilot plant investigation of recovery of fines resulting from the manufacture of zirconium sponge and zirconium crystal bar. Diagrams, photographs, flowsheet, tables. (A8, C4, Zr)

32-A. Observation and Control of Dust on a Pneumatic Chisel, Portable Abrasive Wheel, and Bench Grinder. W. B. Lawrie, A. T. Holman and E. B. James. *Foundry Trade Journal,* v. 99, Nov. 24, 1955, p. 593-600.

New method of local exhaust ventilation which employs very low air volumes at very high velocities. Tables, diagrams, photographs. 7 ref. (A8, G18)

33-A. Trends in Metallurgical Research in the United States. Edgar C. Bain. *Iron and Steel Institute, Journal,* v. 181, Nov. 1955, p. 193-212 + 7 plates.

Developments in studies of X-ray metallography, analysis of steel by X-ray fluorescence, transformations in sodium, nature of martensite, tempering, effect of boron on hardenability of steel, electron metallography, diffusion mechanisms, dislocations, spiral growth of crystals, fatigue behavior, zone melting and the physical chemistry of steelmaking. Graphs, diagrams, photographs, micrographs. 106 ref. (A general)

34-A. Wet and Dry Filtration Studies — Electric Furnace Ferrosilicon Fume Collection. Leslie Silverman and Robert A. Davidson. *Journal of Metals,* v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Dec. 1955, p. 1327-1335.

Determines stack concentrations and volumes of material evolved; physical and chemical nature of the collected fume. Describes wet and dry collector studies undertaken to recover the fume. Diagrams, tables. 4 ref. (A8, D5)

35-A. (Polish.) **Industrial Safety and Hygiene in Plant Area Activitives of the Openhearth Steel Mill.** Jozef Splewinski. *Wiadomosci hutnicze,* v. 11, no. 10, Oct. 1955, p. 311-315.

Storage and handling of charge materials; preparation and flame-cutting of scrap; handling of scrap equipment; general safety rules. (A5, A7, A8, D2, ST)

36-A. (Polish.) **China — Industrial Power of the Future.** Wladyslaw Gryksztas. *Wiadomosci hutnicze,* v. 11, no. 10, Oct. 1955, p. 321-326.

For the sixth anniversary of Red China's regime, author reviews metallurgical progress, including steel work at Anshan southwest of Mukden. Photographs. (A4, ST)

37-A. (Russian.) **Heat Exchange in Continuous Furnaces.** M. A. Glinkov and A. G. Zen'kovskii. *Izvestiia akademii nauk SSSR, otdelenie tekhnicheskikh nauk,* 1955, no. 10, Oct. p. 138-142.

Effect of screen on heat-exchange intensity; efficiency of direct-flow continuous two-zone furnaces; comparison of variations of counter and direct-flow arrangements; calculations of radiant heat exchange. Diagrams, graphs. 2 ref. (A general)

38-A. Control and Treatment of Metal Finishing Wastes. J. C. Hesler. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 101 + 9 pages.

Preliminary considerations of material conservation and design. Specific treatments of chromium, cyanide, acid and alkali wastes, oily emulsions and mixed wastes. (A8)

39-A. Activated Carbon Treatment of Plating Solutions. Walter A. Helbig. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 396-399.

Uses of continuous and periodical carbon treatment. (A8, L17)

40-A. Modern Reclamation of Non-Ferrous Metals. S. W. Platt. *Metal Industry,* v. 87, Dec. 23, 1955, p. 523-526.

Origin and types of scrap and its distribution. Photographs. (To be continued.) (A8)

41-A. A Dictionary of Metallurgy. A. D. Merriman and J. S. Bowden. *Metal Treatment and Drop Forging,* v. 22, Dec. 1955, p. 532-538.

Defines "roke" to "rust remover". Diagrams, tables, graph. (To be continued.) (A10)

42-A. What Metalworking Management Expects in 1956. *Steel (Metalworking Yearbook Issue),* v. 138, Jan. 2, 1956, p. 105-112.

Survey of managers' expectations with regard to employment, selling prices, sales volume, unit cost of manufacturing, capacity, sales and distribution costs, and research for 1956. Tables, graphs. (A4)

43-A. 1956 Metalworking Facts and Figures. *Steel (Metalworking Yearbook Issue),* v. 138, Jan. 2, 1956, p. 145-192.

Figures on production, sales, labor, prices and earnings. Diagrams, graphs, tables. (A4)

44-A. Technical Progress. *Steel (Metalworking Yearbook Issue),* v. 138, Jan. 2, 1956, p. 195 + 100 pages.

Brief comments by metalworking experts in the fields of steelmaking, nonferrous production, materials, metallurgy, heat treating, testing, drives, controls, machining, tooling, forming, cleaning, finishing, joining, packaging, lubrication, service and maintenance. Photographs. (A general)

45-A. (Pamphlet.) **Boron.** Joseph C. Arundale and Flora B. Mentch. 10 p. Preprint from Bureau of Mines Minerals Yearbook 1953. Available from Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. $0.05.

Trade statistics, prices, uses, and technology. Tables. 29 ref. (A4, B)

46-A. (Pamphlet.) **Calcium.** Joseph C. Arundale and Flora B. Mentch. 4 p. Preprint from Bureau of Mines Minerals Yearbook 1953. Available from Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. $0.05.

Trade statistics, prices, uses, and technology. Tables. 8 ref. (A4, Ca)

47-A. (Pamphlet.) **Chromium.** Charles Katlin and Hilda V. Heidrich. 16 p. Preprint from Bureau of Mines Minerals Yearbook 1953. Available from Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. $0.05.

Production, consumption, uses, stocks, prices, trade, and technology. Tables. 19 ref. (A4, Cr)

48-A. (Pamphlet.) **Tungsten.** Robert W. Geehan and Mary J. Burke. 13 p. Preprint from Bureau of Mines Minerals Yearbook 1953. Available from Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. $0.05.

Production, consumption, uses, prices, stocks, trade statistics, and technology. Tables. 24 ref. (A4, W)

49-A. (Pamphlet.) **Uranium, Radium, and Thorium.** John E. Crawford. 42 p. Preprint from Bureau of Mines Minerals Yearbook 1953. Available from Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. $0.05.

Trade statistics, prices, uses, production, and consumption. Maps, tables. 82 ref. (A4, U, Ra, Th)

50-A. (Book.) **Titanium and Titanium Alloys Programs.** v. III-IV. 72 and 121 p. 1955. Air Materiel Command, Wright-Patterson Air Force Base, Ohio.

Outlines, for information to both industrial and government agencies, the conception, objectives, and proposed procedures of the Steering Group on Titanium Research and Development of the Department of Defense and the Titanium Metallurgical Laboratory at Battelle Memorial Institute. Projects completed and in process are listed, giving title and scope, contracting agency, and status of work. (A9, Ti)

51-A. (Book.) **Reports on the Progress of Applied Chemistry.** v. XXXIX. 1125 p. 1954. Society of Chemical Industry, 56 Victoria St., London, S.W. 1, England.

Reviews chemical developments in 1954 to include metallurgy, fuels, biology, textiles, plastics, and food. Pertinent papers are abstracted separately. (A general)

52-A. (Book.) **Ultrasonic Engineering With Particular Reference to High Power Applications.** Alan E. Crawford. 344 p. 1955. Academic Press, 125 East 23rd St., New York 10, N. Y. $8.00.

Theory, methods of generation, and applications with particular reference to metallurgical uses. (A general, S general)

53-A. Metalworking Roundup. *Iron Age,* v. 177, Jan. 5, 1956, p. 160-178.

Progress in 1955 and forecast of future developments in machining, joining, casting, stamping and forming, testing, materials handling, metallurgy, metal finishing, heat treating. Photographs. 21 ref. (A general)

54-A. Price and Production Data 1956. *Iron Age,* v. 177, Jan. 5, 1956, p. 285-300.

Statistics and trends for 1956 in steel, nonferrous metal powders, ferro-alloys, pig iron, iron ore, scrap. Tables, graphs. (A4)

55-A. Engineering Features of Uranium Plant Design. II. S. Craib. *South African Mining and Engineering Journal,* v. 66, pt. 2, Dec. 3, 1955, p. 511 + 4 pages.

Some of the major items of equipment used in a uranium plant in South Africa and an estimated capital cost for the plant and ancillary equipment. Diagrams, photographs. (A5, B14, U)

56-A. Scheduling and Inventory Control of Cold Drawn Orders. T. W. Harman and J. C. Farrell. *Wire and Wire Products,* v. 31, Jan. 1956, p. 46-48.

A step by step description of an accurate and flexible scheduling job. (A5, F28)

57-A. Production Scheduling and Inventory Control. John L. Sanderson. *Wire and Wire Products,* v. 31, Jan. 1956, p. 48-49.

Summarization of handling of inventory control problems. (A5, F28)

58-A. (English.) **Rail Transport of Hot Ingots.** *Aciers fins & spéciaux francais,* no. 21, Nov. 1955, p. 17-19.

Novel process may improve operations in French steel industry. Photographs, diagram. (A5, ST)

59-A. (English.) **The European Coal and Steel Community.** D. P. Spierenburg. *Jernkontorets Annaler,* v. 139, no. 11, 1955, p. 863-884.

General account of the European coal and steel community and its activities. Development of a common market and solving incident social problems. (A4, ST)

60-A. (Spanish.) **Toxic Gases and Vapors in Welding.** J. Dantin Gallego. *Ciencia y técnica de la soldadura,* v. 5, no. 26, Sept.-Oct. 1955, 4 p.

Different gases to which the welder may be exposed and the effect of different concentrations on the body. Tables, diagram. 23 ref. (A7, K general)

61-A. Steel Industry Provides Record Tonnage of Steel in 1955 and Steps Up Plans for Expansion. Max D. Howell. *Blast Furnace and Steel Plant,* v. 44, Jan. 1956, p. 41.

Condensed review of statistics relating production, employment, wages and equipment. (A4, ST)

62-A. Consumption of Purchased Scrap in 1955 at a New Peak. Edwin C. Barringer. *Blast Furnace and Steel Plant,* v. 44, Jan. 1956, p. 42-43.

Statistics on domestic consumption and figures on the amount and costs of scrap exported to all countries. Photographs. (A4, A8, Fe, ST)

63-A. Westinghouse Operates Metal Processing Plant. Warren Trigg. *Blast Furnace and Steel Plant,* v. 44, Jan. 1956, p. 51-54.

Plant satisfies demand for raw metals to keep pace with technical developments in the electrical industry. Photographs, diagram. (A5, T1)

64-A. Feeding Chemicals to Boilers in Steel Mill Power Plants. Douglas E. Noll. *Blast Furnace and Steel Plant,* v. 44, Jan. 1956, p. 82-86.

Method and rate of phosphate feeding, pumps and eductors. Graphs, diagram, flowsheet. (A5)

65-A. Metal Losses and Balances in the Brass Foundry. Harry St. John. *Foundry,* v. 84, Jan. 1956, p. 84-87.

Foundry profit depends upon maintaining a high proportion of good finished castings to a minimum net metal loss. Photograph, tables. (A5, A8, E general, Cu)

66-A. Modern Reclamation of Non-Ferrous Metals. S. W. Platt. *Metal Industry,* v. 87, Dec. 30, 1955, p. 549-553.

Economical sorting and grading of high-tensile brass and manganese bronze, alloy grades in borings and turnings, scrap electric cables. Photographs. (A8, Cu, Mn)

67-A. Training of Technical and Scientific Manpower in the U.S.S.R. N. H. Polakowski. *Metal Progress,* v. 69, Jan. 1956, p. 68-72.

Methods employed and results achieved by Russia in training engineers and scientists. Diagram, photographs. (A3)

68-A. Metallurgical Research in India. R. F. Bunshah. *Metal Progress,* v. 69, Jan. 1956, p. 88-90.

Work being done in four governmental, four universities and one industrial laboratory, from which several new manufacturing processes have been derived. (A9)

69-A. Metalworking in Colombia, South America. Gerald X. Diamond. *Metal Progress,* v. 69, Jan. 1956, p. 97-101.

Colombia's metal industries, methods being used, technical assistance, mining operations, future possibilities. Map, photographs. (A general)

70-A. Safety: It's No Accident. Charles H. Elsby. *Modern Castings,* v. 29, Jan. 1956, p. 38-39.

Long-range safety program in

operation reduces accident frequency 78% below the national foundry average. Photographs. (A7)

71-A. Recovery of Iodine From Cerium Slag. J. E. Powell, Clifford Hach and R. W. Nottorf. *U. S. Atomic Energy Commission,* TID-5212, Sept. 1955, p. 41-42.

Investigation of wet and dry methods of iodine recovery. Diagram, 1 ref. (A8, B21, C26, I, Ce)

72-A. Production Standards and Their Place in the Foundry Industry. Stuart D. Martin. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 317-324.

Cost estimating based on production standards and the value of standards in foundry operations. Photographs. (A5, E general)

73-A. Your Hidden Fixed Costs and Their Effect on Profit and Loss. M. E. Annich. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 363-366.

How hidden fixed costs affect profit and loss in the foundry. Graphs, tables. (A4, E general)

74-A. Improving Foundry Paperwork. M. E. Mundel. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 413-418; disc., p. 418.

Evaluates "communications" in respect to paperwork in the foundry and shows the significance of assignment of clerical tasks, flow of forms, and formates. Photographs, flow charts. (A5, E general)

75-A. The Safe Handling of Radioactive-Pyrophoric Materials. L. R. Kelman, W. D. Wilkinson, A. B. Shuck and R. C. Goertz. *Argonne National Laboratory (U. S. Atomic Energy Commission),* ANL-5509, Dec. 1955, 73 p.

Methods of safely handling large amounts of high-intensity alpha emitters. Health hazards and methods of protecting personnel. Diagrams, photographs, tables. 32 ref. (A7)

76-A. Dust Generation and Control in Foundries. W. H. White. *Iron & Steel,* v. 29, Jan. 1956, p. 3-7.

Dust sampling and estimation procedures. Ventilation of areas used for pouring, cooling, knocking out and cleaning castings. Photographs, diagrams. (A8, E general)

77-A. Steel Management on Two Continents. Frederick H. Harbison, Ernst Kochling, Frank H. Cassell and Heinrich C. Ruebmann. *Management Science,* v. 2, Oct. 1955, p. 31-39.

Comparison of the numbers of persons in various levels of management or supervision and the nature of the educational background of those holding managerial positions; trends in managerial organization and in access to supervisory and managerial positions. Tables. (A6, A3)

77-A. Explosions Occurring During Chemical Etching or Pickling of Uranium-Zirconium Alloys. H. P. Roth. *Massachusetts Institute of Technology (U. S. Atomic Energy Commission),* MIT-1105, Dec. 1952, 16 p.

Factors responsible for five minor explosions occurring in various departments of the laboratory. Alloys of greater than 75 wt.% uranium should not be placed in nitric acid. (A7, L12, U, Zr)

78-A. Linear Programming. . .An Application to Swarf Recovery. II. E. Kay and G. Morton. *Metalworking Production,* v. 99, Dec. 30, 1955, p. 2215-2219.

Economical mixing of materials. The Simplex method may be used to solve any programming problem. Graphs, tables. (A8)

79-A. Nickel Story. *Plating,* v. 43, Jan. 1956, p. 91-106.

A series of statements, on the effect of the nickel shortage, contributed by members of the National Association of Metal Finishers, the American Electroplaters' Society, and other private organizations. Graphs, tables. (A4, Ni)

80-A. More Work for Water. *Steel,* v. 138, Jan. 30, 1956, p. 84-86.

Industry is helping itself as well as the other fellow when it conserves and recirculates water. Photographs, graph. (A5)

81-A. Recent Trends in Plant Layout. Andrew E. Rylander. *Western Machinery and Steel World,* v. 47, Jan. 1956, p. 79-84.

Basic principles of plant layout, automation and use of flat and three-dimensional layout. Photographs, diagrams. (A5)

82-A. (Spanish.) **Fundamentals and Development of Technical Apparatus for the Treatment of Solid and Liquid Metallic Materials With Intensive Mechanical Vibrations, With Special Consideration to the Electrodynamic Process.** Hugo J. Seeman. *Instituto del hierro y del acerò,* v. 8, no. 39, Oct. 1955, p. 459-474.

Different apparatus for generating and transmitting ultrasonic waves. Electrodynamic methods of generating vibrations in a material under treatment. Graphs, diagrams. (A general, S13)

83-A. (Book.) **Hawley's Technical Speller.** Gessner G. Hawley and

Alice W. Hawley. 146 p. 1955. Reinhold Publishing Corp., 430 Park Ave., New York 22, N. Y. $2.95.

Indicates correct spelling of 8000 technical words selected from the vocabularies of metallurgy, chemistry, physics, engineering, electronics, and other fields of science and technology. (A10)

84-A. (Book.) **Index to the Year Books and Regional Papers of the American Iron and Steel Institute 1910-1953.** Jeanne McHugh, compiler. 593 p. 1955. University of Oklahoma Press, Norman, Okla. $12.50.

A combined subject and author index to the Year Books of the Institute. (A general, Fe, ST)

85-A. (Book.) **Symposium on Electronics and Automatic Production, Proceedings.** 171 p. 1955. National Industrial Conference Board, Inc., 247 Park Ave., New York 17, N. Y. and Stanford Research Institute, Menlo Park, Calif.

Problems which arise and the opportunities offered by automation in various businesses and industries. Economic and social implications of automation. (A5)

86-A. (Book.) **Vacuum Metallurgy.** 213 p. 1955. Electrochemical Society, Inc., 216 West 102nd St., New York 25, N. Y.

Contains nineteen papers presented at the Vacuum Metallurgy Symposium of the Electrothermics and Metallurgy Division of the Electrochemical Society in Boston in Oct. 1954. Furnaces, techniques, and applications are covered. (A general)

87-A. Metallurgy. H. A. Holden. *Chemical & Process Engineering,* v. 37, Jan. 1956, p. 17-20.

Review covering recent developments in aluminum and aluminum alloys, titanium, ferrous and nonferrous alloys, protective treatments, processes and tests of metals. Photographs. 77 ref.
(A general, Al, Ti, ST, EG-a)

88-A. Britain's Place in World Engineering. II. Raw Materials: Consumption and Price. *Engineering,* v. 181, Jan. 13, 1956, p. 45-47.

Analysis of consumption and price trends and their effect on the engineering industry. Graphs.
(A4, Cu, Al, ST, Sn, Ni)

89-A. Westinghouse Metallurgical Plant at Blairsville, Pa. Warren M. Trigg. *Industrial Heating,* v. 23, Jan. 1956, p. 70 + 7 pages.

New pilot plant provides complete range of processing equipment in step toward producing new and better metals and metallurgical processes for use in electrical industry. Plant design and operation. Photograph, diagram. (A5, T1)

90-A. Cleaning of Open Hearth Stack Gases: II. Leslie Silverman. *Industrial Heating,* v. 23, Jan. 1956, p. 96, 98, 100, 102.

Continuously formed recycled filter method using fine fiber slag wool gives satisfactory performance. Diagram. (To be continued.)
(A8, D2, ST)

91-A. More Nickel Seen Available for Industry in '56 With Free World Output at 442,000,000 Lb. John F. Thompson. *Metals (Daily Metal Reporter Monthly Supplement),* v. 26, Jan. 1956, p. 7-8, 19.

Distribution, prices, applications, plating supplies and outlook for 1956. (A4, Ni)

92-A. Copper Outlook in 1956 Called Promising With Rough Balance Expected in Supply and Demand. *Metals (Daily Metal Reporter Monthly Supplement),* v. 26, Jan. 1956, p. 9-10.

Effect of strikes on industry, world condition governing copper supply and consumption, newly completed mining projects which will add substantially to production capacity, shortcomings of substitutes, reserves, future outlook.
(A4, Cu)

93-A. An Aluminum Distributor Looks Ahead. E. A. Farrell. *Modern Metals,* v. 11, Jan. 1956, p. 40, 44.

Trends toward warehouse distribution of less-than-carload lots, free delivery system, expansion of services to cater to do-it-yourself trade and to small fabricator are anticipated by industry's all-aluminum distributor. (A4, A5, Al)

94-A. Forecast for Light Metals in 1956. *Modern Metals,* v. 11, Jan. 1956, p. 86-88, 90-91.

Discusses record production of aluminum, magnesium and titanium during 1955, new plants and expansion planned by various light metals producers and fabricators for 1956 and alloys being developed and new applications anticipated.
(A4, Al, Mg, Ti)

95-A. Abating Noise in Steel Tank Fabricating Shop. Francis A. Westbrook. *Steel Processing,* v. 42, Jan. 1956, p. 21, 59.

How one factory solved severe noise problem by use of Fiberglas baffle plates suspended vertically from parallel steel wires running length of building. In this way they did not interfere with overhead traveling cranes, light fixtures or skylights. Additional baffles were hung from wires in alternate bays close to walls on both sides of interior.

Noise reduction by this method was greater than 50%. Phototgraphs. (A7)

96-A. What Warehouse Service Means to Magnesium Users. Ralph W. Shaw, Jr. Paper from "The User Speaks About Magnesium". Magnesium Association, 6 p. + 1 plate.

Enumeration of the values of warehouse storage and supplying of magnesium to industry. Photograph. (A5, Mg)

97-A. (English.) **The Use of Tubes in the Materials Handling Industry.** G. B. Stewart. *Acier, Stahl, Steel,* v. 20, no. 12, Dec. 1955, p. 487-489.

Considers only the equipment for handling processed or semiprocessed goods and gantries for conveyor belt systems. Photographs. (A5, T5, ST)

98-A. (Czech.) **Basis for Designing and Planning Hygienic Technical Equipment in Foundries.** Josef Mejstrik. *Slévarenstvi,* v. 3, no. 12, Dec. 1955, p. 391-395.

Temperature conditions and ventilation which govern efficient foundry design. (A7, E general)

99-A. (Russian.) **Quaternary Mutual Systems Consisting of Fluorides and Chlorides of Sodium, Potassium, Calcium and Barium as the Basis of Fluxes for Remelting Light Metal Scrap.** G. A. Bukhalova and A. G. Bergman. *Zhurnal prikladnoi khimmi,* v. 28, no. 12, Dec. 1955, p. 1266-1274.

Efficacy of fluxes for remelting and refining of aluminum scrap, especially in elimination of oxide and nitride films. Graphs, diagrams, tables. 7 ref. (A8, C21, Al)

100-A. The Process Equipment and Protective Enclosures Designed for the Fuel Fabrication Facility—Facility #350. A. B. Shuck and R. M. Mayfield. *Argonne National Laboratory (U. S. Atomic Energy Commission),* ANL-5499, Jan. 1956, 160 p.

Report on concepts, design, mockup construction and testing of equipment and hoods for the fabrication of reactor fuels containing plutonium or U^{233}, with particular emphasis on the process equipment requirements, radiological and toxicological hazards, hooding concepts, hood designs and construction. Diagrams, photographs, tables. (A7, A5, Pu, U)

101-A. The Current Work of the British Non-Ferrous Metals Research Association. G. L. Bailey. *Birmingham Metallurgical Society, Journal,* v. 35, Dec. 1955, p. 322-344.

Review of organizations and activities. Research projects include studies of blistering in brass sheet, stretcher strain markings in aluminum alloys and properties of cast metals. Diagrams, graphs, photographs, micrographs. (A9, EG-a)

102-A. Reactor Heat Transfer Information Meeting Held at Brookhaven National Laboratory, October 18-19, 1954. *Brookhaven National Laboratory, Division of Engineering (U. S. Atomic Energy Commission),* BNL 2446, Dec. 1955, 194 p.

Twelve papers on various phases of heat transfer. Pertinent papers abstracted separately. Diagrams, graphs, micrographs, tables. (A general)

103-A. A Method for Recovery of Zinc Plating Solutions. *Finish,* v. 13, Feb. 1956, p. 19, 81.

Double effect evaporator has proved to be an economical way of recovering zinc, supplying distilled rinse water and eliminating stream pollution. Photographs, flow diagram. (A8, L17, Zn)

104-A. Steel Capacity. *Iron Age,* v. 177, Feb. 2, 1956, 6 p.

Coke, ingot, blast furnace and steel production capacities for companies and districts. Tables. (A4, D general, ST)

105-A. Pittsburgh Steel's New Hot and Cold Strip Mill at Allenport, Pa. H. A. Long and J. C. Peth. *Iron and Steel Engineer,* v. 33, Jan. 1956, p. 57-66; disc., p. 66.

Addition of flat rolling mills has reduced fluctuation in the company's operations and a much more satisfactory product mix has been obtained which should result in more profitable operations. Mill units and layout described. Diagrams, photographs, tables. (A5, F23, ST)

106-A. Scope of the Furnace Fume Control Problem. H. L. Richardson. *Iron and Steel Engineer,* v. 33, Jan. 1956, p. 105-111.

Different types of gas cleaning equipment, and methods and problems in their applications to steelmaking facilities to provide visually clean stack discharges. Photographs, graph, diagrams. 3 ref. (A8, D1, D2, ST)

107-A. Development in the Iron and Steel Industry During 1955. I. E. Madsen. *Iron and Steel Engineer,* v. 33, Jan. 1956, p. 119-166.

Reviews production of iron and steel during 1955. Trends in expansion of facilities and collateral trends in availability of alloy materials, coke and ore. New processes, equipment, layouts. Tables, graph, photographs, diagrams. (A general, D general, ST, Fe)

108-A. The Structural Iron of the Parthenon. C. J. Livadefs. *Iron and Steel Institute, Journal,* v. 182, Jan. 1956, p. 49-66. (Translated from the Greek by E. K. Mazijoglou.)

Representative samples of Parthenon iron (two dowels and two clamps) studied by metallographic, mechanical and chemical testing. The paper takes full account of ancient Greek writings dealing with ferrous metallurgy and the work of previous investigators. Photographs, tables, micrographs, diagrams. 16 ref. (A2, Fe)

109-A. French Aluminum Developments in Africa. *Light Metals,* v. 19, Jan. 1956, p. 26-27.

Facilities and production of French African aluminum plants, ore sources and available power. Map, photographs. (A4, B10, Al)

110-A. A Dictionary of Metallurgy. A. D. Merriman and J. S. Bowden. *Metal Treatment and Drop Forging,* v. 23, Jan. 1956, p. 13-20.

Defines metallurgical terms from "rust prevention" to "S-curve." Tables, graphs diagrams. (A10)

111-A. Interrelation of Manufacture, Magnetic Properties, and Engineering Design of Magnetic Apparatus. T. J. Murrin. Paper from "Conference on Magnetism and Magnetic Materials". American Institute of Electrical Engineers, p. 305-314.

A flow process chart outlines typical operations involved in processing of mill material into magnetic core structures. Information on the processing elements which cause deterioration of the basic properties of these strain-sensitive alloys. Diagrams, graphs. 19 ref.
(A general, P16, SG-n, p)

112-A. (Czech.) **Safe Handling of Radioactive Isotopes for Inspection Purposes.** T. Unger. *Strojirenstvi,* v. 5, no. 12, Dec. 1955, p. 928-933.

Standard instructions and maximum permissible radiation; design and calculation of protective housings and shields; methods of keeping tabs on radioactivity. Tables, graphs, photographs. 7 ref.
(A7, S19)

113-A. (Czech.) **Safety and Protection in Flame and Electric-Arc Welding.** Eduard Jiru. *Zvaranie,* v. 4, nos. 9-10, Sept. 1955, p. 301-305.

Effect of ultraviolet radiation on the eyes, infra-red radiation and welding fumes. Collective and individual safety rules and protective equipment. 7 ref. (A7, K1)

114-A. (Polish.) **Bases for Figuring Costs and for Calculations in the Metallurgy of Iron. I.** Robert Cop. *Wiadomosci hutnicze,* v. 11, no. 12, Dec. 1955, p. 386-389.

Types of costs, materials and fuels, labor and social security, power costs, services, permanent installations. Tables. (A4, ST, Fe)

115-A. Recovery of Dust and Fume From Metallurgical Gases. R. Bainbridge. *American Institute of Mining Metallurgical and Petroleum Engineers, Preprint,* 1956, Feb., 17 p. + 11 plates.

Gas conditioning for dust recovery by electrostatic precipitation. Gas cooling for baghouse operation. Dust recovery from wet gas. Photographs, diagram, graphs, tables.
(A8, C21, Pb)

116-A. The Tata Iron and Steel Company, Ltd. L. N. Collins. *Blast Furnace and Steel Plant,* v. 44, Feb. 1956, p. 178-198.

Detailed description of Indian steel plant, its equipment and operation. Tables, photographs.
(A5, ST)

117-A. Expansion in Australian Steelmaking. W. P. Goodwin. *British Steelmaker,* v. 22, Feb. 1956, p. 40-43.

Review of Australian steelmaking industry. Photographs, map.
(A4, ST)

118-A. Aluminum. Delwin D. Blue and Horace F. Kurtz. *Bureau of Mines Minerals Yearbook, Preprint,* 1953, 21 p.

Review of domestic production, consumption and uses, stocks, foreign trade, prices, technology, and similar information from other countries. Tables, graphs. 41 ref
(A4, Al)

119-A. Copper. Helena M. Meyer and Gertrude N. Greenspoon. *Bureau of Mines Minerals Yearbook, Preprint,* 1953, 56 p.

Domestic production, consumption, stocks, prices, foreign trade, technology, extensive review of world production information. Graphs, tables. 68 ref. (A4, Cu)

120-A. Ferroalloy. Robert W. Geehan. *Bureau of Mines Minerals Yearbook, Preprint,* 1953, 10 p.

Domestic production, prices, foreign trade, technology, foreign production. Tables. 17 ref. (A4, Fe)

121-A. Iron and Steel. James C. O. Harris. *Bureau of Mines Minerals Yearbook, Preprint,* 1953, 28 p.

Domestic iron and steel situation with a briefer review of world production figures. Tables, graph. 25 ref. (A4, ST, Fe)

122-A. Iron Ore. Jachin M. Forbes. *Bureau of Mines Minerals Yearbook, Preprint,* 1953, 30 p.

Domestic production, consumption and use, transportation, foreign trade, technology and industrial development, reserves, employment, world situation. Tables, graph. 17 ref. (A4, Fe)

123-A. Magnesium. H. B. Comstock. *Bureau of Mines Minerals Yearbook, Preprint.* 1953, 10 p.

Domestic production, consumption and uses, prices, foreign trade, technology, similar information from foreign countries. Tables, graph. 23 ref. (A4, Mg)

124-A. Manganese. Gilbert L. DeHuff. *Bureau of Mines Minerals Yearbook, Preprint,* 1953, 24 p.

Domestic production, consumption and stocks, foreign trade, and technology, world situation. Tables. graph. 36 ref. (A4, Mn)

125-A. Sodium and Sodium Compounds. Joseph C. Arundale and Flora B. Mentch. *Bureau of Mines Minerals Yearbook, Preprint,* 1953, 8 p.

Domestic production, consumption and uses, prices, foreign trade, technology, review of world situation. Tables. 20 ref. (A4, Na)

126-A. The National Mineral Results for 1955. H. McLeod *Canadian Mining Journal,* v. 77, Feb. 1956, p. 60-70.

Canadian mineral production and consumption statistics for 1955. Photograph, tables. (A4, B10)

127-A. 87th Annual Survey and Outlook. Major Metals. M. A. Kriz, Francis H. Wemple, Simon D. Strauss, Robert L. Ziegfeld, Charles R. Ince, Irving Lipkowitz, J. D. Hanawalt, Jack Kratchman, George H. Cleaver and Thomas W. Lippert. *Engineering and Mining Journal,* v. 157, Feb. 1956, p. 75-96.

Summary of production and consumption, imports and exports, price trends, uses, 1956 outlook for gold, silver, copper, lead, zinc, tin, uranium, aluminum, magnesium and titanium. Tables, graphs.
(A4, Au, Ag, Cu, Pb, Zn, Sn, U, Al, Mg, Ti)

128-A. 87th Annual Survey and Outlook. Ferroalloys. Hubert W. Davis, Gilbert L. DeHuff, Jr., Wilmer McInnis and R. W. Holliday. *Engineering and Mining Journal,* v. 157, Feb. 1956, p. 97-103.

Survey of ferro-alloys and nickel, cobalt, manganese, chromium, tungsten and molybdenum production, with data regarding prices, consumption, research, imports and exports. Tables.
(A4, Fe-n, Ni, Co, Mn, Cr, W, Mo)

129-A. 87th Annual Survey and Outlook. Minor Metals. Paul F. Yopes, Abbott Renick, H. T. Reno, Ottey M. Bishop, Joseph C. Arundale, James W. Pennington, James E. Bell, F. D. Lamb, Fred P. Giese and John E. Crawford. *Engineering and Mining Journal,* v. 157, Feb. 1956, p. 104-112.

Statistics regarding production, research, prices, imports and exports, consumption, applications, future outlook for the minor metals. Tables. (A4, EG-b)

130-A. Safe Handling of Alkali Metals. Marshall Sittig. *Industrial and Engineering Chemistry,* v. 48, Feb. 1956, p. 227-229.

Storage problems, protective equipment, housekeeping problems, and fire extinguishing with lithium, potassium and sodium. 17 ref.
(A7, EG-e)

131-A. Automatic Fire System Minimizes Paint Shop Risks. *Iron Age,* v. 177, Feb. 23, 1956, p. 94-95.

How one plant, once burned, set about hedging against future fire risks with improved equipment. Photographs. (A7, L26, ST)

132-A. Review and Outlook for the Iron Ore Industry. A. L. Fairley, Jr. *Mining Congress Journal,* v. 42, Feb. 1956, p. 62-64.

Statistics and economics for the iron ore industry. Photographs.
(A4, Fe)

133-A. Aluminum Outlook. Walter L. Rice. *Mining Congress Journal,* v. 42, Feb, 1956. p. 68-69.

Predicted outlook for aluminum industry, statistics and economics. Photographs. (A4, Al)

134-A. Uranium. Eric R. Rude. *Mining Congress Journal,* v. 42, 1956, p. 78-81.

One of the outstanding developments in 1955 was the high degree of participation of private industry in exploration, mining and processing. Photographs, map. (A4, U)

135-A. Copper. Helena M. Meyer. *Mining Congress Journal,* v. 42, Feb. 1956, p. 82-84.

High demand, strikes and rising prices characterize the past year in the copper industry. Photographs. (A4, Cu)

136-A. Lead. Wallace G. Woolf. *Mining Congress Journal,* v. 42, Feb. 1956, p. 89-90.

1955 was a year of intensified activity; outlook for 1956 is optimistic. Photographs, table. (A4, Pb)

137-A. The Zinc Industry in 1955. Howard Lee Young. *Mining Congress Journal,* v. 42, Feb. 1956, p. 92-93.

The statistical and economic activities of the zinc industry for 1955. Photographs, tables. (A4, Zn)

138-A. Titanium. C. I. Bradford. *Mining Congress Journal,* v. 42, Feb. 1956, p. 105-106.

Mill products output increased over 50% since 1954 and greater proportionate increase is predicted for this year. Photographs. (A4, Ti)

139-A. Strategic Metals. S. H. Williston. *Mining Congress Journal,* v. 42, Feb. 1956, p. 119-121.

Improved government minerals policy is required or the domestic strategic metals industry faces a shut down. An economical and statistical report. Photographs. (A4, W, Hg, Sb, Cr, Mn)

140-A. Magnesium. Jerry Singleton. *Mining Congress Journal,* v. 42, Feb. 1956, p. 142-143.

Steady growth in a healthy industry is marked by expanding consumer market. Photographs, table. (A4, Mg)

141-A. Gold in 1955. Robert W. Bachelor. *Mining Congress Journal,* v. 42, Feb. 1956, p. 144-146.

Based on monthly report, gold production of the world is estimated to have set a new post-war record of more than $950,000,000 in value. Photographs. (A4, Au)

142-A. Light Metals in 1955. Kim Darby. *Modern Metals,* v. 12, Feb. 1956, p. 62-66.

Review of aluminum, magnesium and titanium industries in 1955. (A4, Al, Mg, Ti)

143-A. Dollars Down the Drain. George E. Barnes. *Steel,* v. 138, Feb. 6, 1956, p. 136-138, 140, 142.

An analysis of industry's waste disposal problem and proposals concerning waste control. Photograph, tables, graph. (A8)

144-A. Prosperity and Profits in the Drop Forging Industry. Gordon R. Walker. *Steel Processing,* v. 42, Feb. 1956, p. 79-82.

Sources of profits and advantages to the company. Recent net sales and profits compared with other industries. Graphs. (A4, F22)

145-A. (Book.) **Vocational and Professional Monographs. No. 33. Metallurgy.** Alvin S. Cohan. 20 p. 1955. Bellman Publishing Co., Cambridge 38, Mass.

An attempt to give some indication of the over-all aspects of the interesting and rewarding branch of metallurgical engineering. 14 ref. (A3, A6)

146-A. (Book.) **Proceedings of the 1954 Cryogenic Engineering Conference.** William B. Hanson, Compiler. NBS Report 3517. 278 p. 1955. National Bureau of Standards, Washington 25, D. C.

Summaries of 57 technical papers dealing with equipment, instrumentation, applications, insulation, properties of materials, special equipment and processes. Papers of interest to metallurgists are abstracted separately. (A general)

147-A. Don't Waste That Acid. E. W. Neben. *American Machinist,* v. 100, Feb. 27, 1956, p. 120-121.

Many platers are beginning to appreciate the serious losses they are suffering through high raw material and operating costs as a result of dumping. An effective way to avoid the loss is described in an acid recovery system, using concentration by evaporation. Diagram, photograph. (A8, L17, Cr, Mg, Zn, Cu, Ni, Ag, Au, ST)

148-A. Why. . . Disaster Control. William M. Stocker, Jr. *American Machinist,* v. 100, Feb. 27, 1956, p. 130-138.

The need for some degree of organized disaster control in every plant—and particularly in every metalworking plant. Basic information for setting up a program and some steps for getting out of trouble. Photographs, diagrams. (A7)

149-A. An Introduction to Incentive Systems. John L. Carter. *Foundry,* v. 84, Feb. 1956, p. 75-77.

A successful incentive system must be preceded by adoption of efficient equipment and methods. Photograph. (A5, E general)

150-A. Control System Cuts Costs in Industrial Truck Operation. Francis A. Westbrook. *Foundry,* v. 84, Feb. 1956, p. 130, 132, 134.

Large steel plant has developed a traffic control-system that speeds up handling, saves maintenance man hours, reduces accidents. Photographs. (A5, E general)

151-A. Cleaning of Open Hearth Stack Gases. III. Leslie Silverman. *Industrial Heating,* v. 23, Feb. 1956, p. 322, 324, 326, 354.

Data for gas cleaning method based on combination of the continuous recycle filter and particle agglomeration. Diagram, table. 5 ref. (A8, D2)

152-A. The Noise Problem in Foundries. *Modern Castings,* v. 29, Mar. 1956, p. 37-52.

Recent legal decisions which have held industry liable for hearing losses by workers explained in special section prepared from material supplied by the Noise Control Committee of the American Foundrymen's Society. Photographs, diagram, graphs, tables. (A7)

153-A. Handling Alpha-Active, Pyrophoric Materials. I. What Is the Best Approach? L. R. Kelman, W. D. Wilkinson, A. B. Shuck and R. C. Goertz. *Nucleonics,* v. 14, Mar. 1956, p. 61-65.

Design and operation details of existing glovebox systems for handling plutonium; philosophy and rules of handling alpha emitters; electrically connected master-slave manipulators. Diagrams, photograph, table. 13 ref.
(A7, H general, Pu)

154-A. Abundances of the Elements. Hans E. Suess and Harold C. Urey. *Reviews of Modern Physics,* v. 28, Jan. 1956, p. 53-74.

Discusses elements with respect to their abundance values and adopted values of these abundances. Based essentially on Goldschmidt's empirical values together with new data from recent literature. In general, Urey's recent abundance table, which uses analyses of the chondrites in preference to other averages, is used rather than other tables. Tables, graphs. 102 ref.
(A4)

155-A. Pilot Plant for Metals. *Westinghouse Engineer,* v. 16, Mar. 1956, p. 47-49.

Layout and equipment of new metallurgical pilot plant for investigating and developing new processing and production methods. Photographs. (A5, A9)

156-A. Experimental Facilities Provided in the Materials Testing Reactor. R. K. Winkleblack. *Argonne National Laboratory, Preliminary Report (U. S. Atomic Energy Commission),* ANL-4551, Dec. 1949, 39 p.

General site of the reactor's facilities, laboratories and shops, details of experimental facilities. Diagrams, graphs, tables. 6 ref.
(A general)

157-A. (Italian.) **The Interest of the Study of Radiation Effects on Solids.** Guido Bonfiglioli, Ernesto Coen, Renato Malvano, Carlo Tribuno and Carlo Mussa. *Ricerca scientifica,* v. 25, no. 11, Nov. 1955, p. 3011-3024.

Illustrates actual state of knowledge about radiation damage phenomena in solids and interest from the point of view of applications as well as of solid state physics. 54 ref. (A general)

158-A. Methods of Conducting Classes for Electroplaters. Ezra A. Blount. *American Electroplaters' Society, Proceedings,* v. 42, 1955, p. 107-112.

Classes currently being conducted in private educational institutions and in public school systems, comparing specific courses of study, course outlines, methods of teaching and other details. Table, photographs. (A3, L17)

159-A. Outlook for the Distribution of Nonferrous Metals. Simon D. Strauss. *American Electroplaters' Society, Proceedings,* v. 42, 1955, p. 222-224.

Current economic position of cadmium, copper, zinc and silver.
(A4, Cd, Cu, Zn, Ag)

160-A. Automatic Control in the Steel Industry. R. W. Holman. *American Iron and Steel Institute, Preprint,* 1955, 18 p.

Brief explanation of automation. Automatic control applications in cold reduction mills, coal chemical processing plant and in openhearth shop. Continuous processing lines, control system types, telemetering and supervisory control, and control systems without moving parts described. Photographs, diagrams, graphs.

(A5, D general, F general, ST)

161-A. The Impending Shortage of Engineers. Hugo E. Johnson. *American Iron and Steel Institute, Preprint,* 1955, 4 p.

Current situation, present and future requirements, corrective measures involving schools, colleges and industrial organizations. Tables, graphs. 18 ref. (A3)

162-A. (German.) **Contribution to the Problem of Long and Short Time Prognosis of the Anticipated Trends in the Economic Development of the Steel Industry.** Horst Bohr. *Stahl und Eisen,* v. 76, no. 3, Feb. 9, 1956, p. 158-163.

Includes graphs, table. 23 ref.
(A4, ST)

163-A. (Book.) **Accident Prevention in Nonferrous - Metal Processing Plants. Sec. III. Smelters, Refineries, and Reduction Plants.** A Bureau of Mines Handbook. 499 p. 1955. United States Government Printing Office, Washington, D. C. $2.00.

Review of industrial safety and health protective measures in connection with materials handling and processing equipment.
(A7, C general)

164-A. (Book.) **Fourth Annual Symposium on Hot Laboratories and Equipment. Held in Washington, D. C., Sept. 29, and 30, 1955.** TID-5280 (Suppl. 1). 123 p. 1956. U. S. Atomic Energy Commission. Available from

the Office of Technical Services, Department of Commerce, Washington 25, D. C.

Machining, shielding, manipulating, storage, tension testing, transfer, viewing and other operations and associated problems. (A9)

165-A. (Book.) **Liquid Metals Handbook. Sodium (Nak) Supplement.** Carrie B. Jackson, R. R. Miller, R. C. Werner, R. A. Tidball, H. E. Grantz, and R. E. Lee, editors. 3rd Ed. 445 p. 1955. U. S. Atomic Energy Commission and Department of the Navy. Available from Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. $2.00.

A comprehensive compilation of experimental data, and analysis and results from practical experience in liquid metal technology. Emphasis placed on properties, fundamentals, system design, components, safety and fire protection, and applications. (A general, Na)

166-A. (Book.) **Alloy Series in Physical Metallurgy.** Morton C. Smith. 338 p. 1956. Harper & Brothers, 49 East 33rd Street, New York 16, N. Y.

Effects of composition and of heat treatment on structures and properties of metals and their alloys. (A general)

167-A. (Book.) **Principles of Physical Metallurgy.** Morton C. Smith. 417 p. 1956. Harper & Brothers, 49 East 33rd St., New York 16, N. Y.

The science of metal behavior presented as an integrated, consistent and satisfying chain of reasoning, extending from the familiar principles of physics and chemistry to the observed behavior of the industrial metals and their alloys. (A general)

168-A. (Book.) **Henley's Twentieth Century Book of Formulas, Processes and Trade Secrets.** Gardner D. Hiscox, editor. Rev. Ed. 867 p. 1955, Norman W. Henley Publishing Co., 254 West 54th Street, New York, N. Y. $5.00.

Data on materials and processes, including adhesives, coatings, alloy compositions and properties, and many recipes useful in the laboratory. (A general)

169-A. (Book.) **Economic Geography of Industrial Materials.** Albert S. Carlson, editor. 494 p. 1956. Reinhold Publishing Corp., 430 Park Ave., New York 22, N. Y. $12.50.

Covers population and transportation, fuel and power, mineral products (to include iron and steel, aluminum, copper, nickel, titanium and lead), natural and synthetic products, and food products. (A4, B10, Fe, Al, Cu, Ni, Ti, Pb)

170-A. Standard Operating Procedure for Thorium Chip Processing. E. W. Mautz, O. R. Magoteaux, P. Kleinsmith and W. B. Clymer. *U. S. Atomic Energy Commission, Research and Development Report,* FMPC-164 (Rev. 1), Jan. 1954, 9 p.

Procedure for grinding, pickling and drying chips for briquetting. (A8, B17, Th)

171-A. Solid State Physics Quarterly Progress Report April-June, 1955. Dwain Bowen. *North American Aviation, Inc. (U. S. Atomic Energy Commission),* NAA-SR-1452, Mar. 1956, 35 p.

Material covers radiation damage to graphite, low-temperature annealing studies of graphite, cold work, radiation damage, mechanical properties of thorium, displacement energy in nickel, activation energies. Graphs. 21 ref. (A general, Th)

172-A. World Steel Production. Eric Ford. *British Steelmaker,* v. 22, Apr. 1956, p. 100-102.

An over-all survey of economic factors. Tables. (A4, ST)

173-A. X-Ray and Gamma-Ray Safety Precautions. *British Welding Journal,* v. 3, Apr. 1956, p. 143-148.

Essential precautions to safeguard personnel from injurious effects of radiations from X and gamma-ray sources. Diagrams, graphs. 4 ref. (A7, S13)

174-A. Pig-Iron and Steel Production. *Foundry Trade Journal,* v. 100, Apr. 12, 1956, p. 185.

Statistical summary of December 1955 returns. (A4, Fe, ST)

175-A. Don't Throw $$$ Away in the Furnace. Harold W. Lownie, Jr. *Modern Castings,* v. 29, May 1956, p. 147-152.

Factors affecting pig and scrap prices; ways to reduce foundry costs; theories on heredity in pig iron. (A4, E10, CI)

176-A. Electrolytic Recovery of Zinc From Galvanizers' Sal Skimmings. P. M. Sullivan. *U. S. Bureau of Mines, Report of Investigations* 5205, Mar. 1956, 21 p.

New application of electro-amalgam metallurgy in recovering all the zinc as refined metal from galvanizers' sal skimmings. Diagrams, photographs, tables. 37 ref. (A8, Zn)

177-A. Statistical Approach to R & D Problems. R. L. Brickley and W. H. Horton. *Electrical Manufacturing,* v. 57, May, 1956, p. 88-94, 362.

Wedding of statistics and engi-

neering aimed at reducing the cost, easing the monotony and improving the validity of research and development testing through scientific design of experiments. Tables. (A4, A9)

178-A. Export Market Potentials. *Metal Industry,* v. 88, Apr. 20, 1956, p. 305-313.

Outlines of needs, world economy and purchasing habits of people. Factors for countries where British manufacturers in the nonferrous and allied industries are likely to find openings. Photographs, tables. 12 ref. (A4)

179-A. Metals. E. M. Sherwood. Paper from "High-Temperature Technology". John Wiley & Sons. p. 17-28.

Metallic materials discussed on the basis of melting point, vapor pressure, high-temperature mechanical properties, relative cost and availability. Tables. 12 ref. (A general, P12, Q general)

180-A. (Czech.) The Effect of Production Equipment on Casting Costs. Miroslav Bednarik. *Slévarenstvi,* v. 4, no. 3, Mar. 1956, p. 65-68.

Wage and equipment costs for manufacture of soil-pipe castings. Graphs, tables. (A4, E general, CI)

181-A. (French.) Metallurgical Factors in the Manufacturing Price of Thin Pieces of Gray Cast Iron. Etienne Doat. *Fonderie,* 1956, no. 122, Mar. 1956, p. 107-111.

Chemical compositions best adapted to production of thin pieces. Cost considerations based on various production factors. Tables. 8 ref. (A4, E general, CI)

182-A. (German.) Automatic Equipment in Galvanizing Shops. K. Gebauer. *Metalloberfläche,* v. 10, no. 4, Apr. 1956, p. 98-103.

Development and methods of operation of transportation systems and other automatic equipment. (A5, L16, Zn)

183-A. (Book.) High-Temperature Technology. I. E. Campbell, editor. 526 p. 1956. John Wiley & Sons, 440 4th Ave., New York 16, N. Y. $15.00.

Summarizes recent developments and indicates importance of established techniques and materials to modern high-temperature technology. Individual papers abstracted separately. (A general)

184-A. (Book.) The Non-Ferrous Metal Industry in Europe. 92 p. 1956, Organization for European Economic Co-Operation, 2, rue André-Pascal, Paris, France.

Report covers period of 1954 and first half of 1955. Aluminum, copper, lead, zinc, tin and nickel are considered with respect to consumption, exports, stocks, production and imports. (A4, Al, Cu, Pb, Zn, Sn, Ni)

185-A. (Book.) Proceedings of the International Conference on the Peaceful Uses of Atomic Energy. Nuclear Chemistry and Effects of Irradiation, v. VII, 691 p., 1956. United Nations, New York. $10.00.

Papers cover fission processes and products, facilities for handling highly radio-active materials, chemistry of transuranics, methods and chemistry of separating heavy elements, effects of radiation on reactor materials, liquids and solids. (A general)

186-A. You Can Reduce Noise in Your Foundry. E. R. Lund and W. O. Hanson. *American Foundrymen's Society, Preprint No.* 56-144, 1956, 4 p.

Shows that the average foundryman can reduce the noise level in his shop effectively without a completely technical approach. Photographs. (A7, E general)

187-A. Some Aspects of Dust Suppression in Foundries. C. M. Stoch. *American Foundrymen's Society, Preprint No.* 56-178, 1956, 11 p.

Methods of dust suppression fall into two main groups, namely dust prevention and dust control. Summary of the research and development projects in the industrial health field. Diagrams, photographs, tables. 11 ref. (A7, A8, E general)

188-A. William Park Woodside and His Philosophy of Research. Alvin J. Herzig. *Metal Progress,* v. 69, May 1956, p. 69-72.

Positive information about a new metal and its rapid introduction into commercial products can best be achieved by two groups of men working together and supplementing each other--one, skilled workmen, the other, scientific researchers—who face squarely and even magnify any shortcomings of a new material or method. Photographs. (A9)

189-A. New Russian Metallurgical Publications. A. G. Guy. *Metal Progress,* v. 69, May 1956, p. 78-80.

New journals indicate that activity in metallurgical research and development has increased in the U.S.S.R., and its quality and quantity are approaching those of the free nations. (A general, U8)

190-A. Atomic Information for Engineers and Industrialists. Ernest E. Thum. *Metal Progress,* v. 69, May 1956, p. 91-94.

A historical note outlining the difficulties in differentiating between information to be held secret lest its publication should endanger "the common defense and security" and

information necessary for an engineer and businessman to know to put the atom to work in peacetime industry. (A6, U8)

191-A. A Dictionary of Metallurgy. A. D. Merriman and J. S. Bowden. *Metal Treatment and Drop Forging,* v. 23, Apr. 1956, p. 145-152.

From "Sharple's process" to "silver". (To be continued.) Diagrams, tables. (A10)

192-A. The South African Uranium Industry. C. S. McLean and T. K. Prentice. Paper from "Proceedings of the International Conference on the Peaceful Uses of Atomic Energy. v. VIII. Production Technology of the Materials Used for Nuclear Energy". United Nations. p. 100-107.

Historical development, occurrence and distribution of uranium in ores, metallurgical practice. Table. (A4, B10, U)

193-A. Fumes and Gases in Welding With Basic (Lime-Bearing) Electrodes. I. Physical Aspects. II. Physiological Considerations. K. Kellermann and G. Lehmann. *British Welding Journal,* v. 3, May 1956, p. 196-200.

Experiments on white rats show that there is no reason to fear danger to health from the fumes developed in welding with basic covered (low-hydrogen type) electrodes. (A7, K1)

194-A. Pretreatment of Metal-Finishing Wastes at Raleigh, North Carolina. J. M. Roberts. *Sewage and Industrial Wastes,* v. 28, Apr. 1956, p. 513-516.

Source of waste, necessity of treatment, design requirements, pretreatment process and operating results. Table, diagram. (A8, L general)

195-A. Recovering Lead and Tin From Wet Solder Drosses. T. T. Campbell, F. E. Block and A. D. Fugate. *U. S. Bureau of Mines, Report of Investigations* 5210, Apr. 1956, 16 p.

Sampling, hydrometallurgy, control of pH, smelting and recovery of leach liquor. Diagrams, tables. 2 ref. (A8, C21, Pb, Sn)

196-A. (Portuguese.) **Expansion Plans in the Aluminum Industry.** Raimundo de Campos Machado. *ABM (Noticiario da Associacao Brasileira de Metais)* v. 10, no. 47, Feb. 1956, p. 4-5.

Review of progress and plans by the director of the Eletro Quimica Brasileira Co. (A4, Al)

197-A. (Portuguese.) **Recovering Zinc From Zinc-Iron Galvanizing Dross by the Process Employed at the Technological Research Institute.** Tharcisio D. de Souza Santos. *ABM(Boletim da Associacao Brasileira de Metais)* v. 12, no. 2, Jan. 1956, p. 15-23; disc., p. 23-26.

In hot dip galvanizing of iron and steel ca[illegible]gs, a crust consisting of θ- or ξ-phase crystals forms on the bath of inferior lead. Recovering zinc from this crust is economically important. Sublimation in vacuum in chromium-nickel cast iron retorts gives 85 to 91% extra action in the form of ingots containing 0.14% lead, max. Photograph. 6 ref. (A8, L16, Fe, Zn)

198-A. Vanadium in Steelmaking, Present and Future. Hugo E. Johnson. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* BMI-JDS-136, Aug. 1948, 57 p.

A survey of technical personnel in the steel industry revealed the opinion that vanadium consumption would increase if the price were reduced and if research established definitely the real effect of vanadium as an alloying element in steel. Graphs, tables, map. (A4, B22, V, ST)

199-A. New and Improved Metallurgical Techniques. C. Sykes. *Institute of Metals, Journal,* v. 84, Apr. 1956, p. 287-290.

Developments of the past 20 years in analysis, metallographic techniques, structural examination and technology. Diagram, graph. 14 ref. (A general)

200-A. Effect of Modernization on Efficiency. Denis McQueen Potter. *Iron and Steel,* v. 29, May 1956, p. 183-187.

Case history of improvements in an English steelworks. (To be continued.) Photographs, table, diagram. (A5, D general, ST)

201-A. A Dictionary of Metallurgy. A. D. Merriman and J. S. Bowden. *Metal Treatment and Drop Forging,* v. 23, May 1956, p. 185-192.

From "silver amalgam" to "solid solution". Graphs, diagrams, tables. (To be continued.) (A10)

202-A. Secondary Metals—Nonferrous. Archie J. McDermid. *U. S. Bureau of Mines Minerals Yearbook, Preprint,* 1953, 34 pages.

Data on recovery of metals from scrap; stocks, consumption and prices of scrap; production of secondary metal products. Graphs, tables. (A8, EG-a)

203-A. Silver. James E. Bell and Kathleen M. McBreen. *U. S. Bureau of Mines Minerals Yearbook, Preprint,* 1953, 20 pages.

Domestic production, consumption

and uses in industry and the arts, monetary stocks, prices, foreign trade and world review. Tables, graphs. (A4, Ag)

204-A. (German.) **Production Planning and Operations Control in a Steel Foundry.** Erwin von der Horst. *Stahl und Eisen,* v. 76, no. 9, May 1956, p. 552-558.

Reasons for establishing a controlled organization; importance of cost evaluation and scheduling departments; statistical control of performance and cost. Charts. (A5, E general, CI)

205-A. (Book.) **Engineering Manual for Control of In-Plant Environment in Foundries.** 145 p. 1956. American Foundrymen's Society, Des Plaines, Ill.

General principles involved in foundry ventilation and hygiene problems; sources of air contaminants and methods of controlling them; ventilating systems. (A7, E general)

206-A. (Book.) **Non-Ferrous Metals in Under-Developed Countries.** 129 p. 1956. United Nations Department of Economics & Social Affairs, New York, N. Y. $1.50.

Patterns of consumption, production and trade; international control schemes; mining, smelting and refining.

(A4, B general, C general, EG-a)

207-A. Will Titanium Ever Go Commercial? P. M. Unterweiser. *Iron Age,* v. 177, June 7, 1956, p. 111-116.

Titanium appears to have an established position in defense applications and a strong commercial future, high costs being the chief drawback at present. Photographs. (A4, T2, Ti)

208-A. Recovery of Zinc From Dross. A. N. Kapoor, A. B. Chatterjea and B. R. Nijhawan. *Journal of Scientific & Industrial Research,* v. 15A sec. A, Apr. 1956, p. 179-182.

Sweating, aluminum and modified aluminum processes were examined, the latter two proving economically feasible when zinc is in short supply. Table, photograph, graph, micrographs. 6 ref. (A8, Zn)

209-A. Ventilation. J. B. Mohler. *Metal Finishing,* v. 54, June 1956, p. 77-80, 98-99.

Selection of chemicals, engineering problem, economic problem, construction materials and design of exhaust system and exhaust rates for common baths. Table, diagrams. (A7, L17)

210-A. Economic Determination of a Mining and Milling Project. James Boyd. *Mining Engineering,* v. 8, June 1956, p. 614-615.

Rate of maximum efficiency, estimation of costs, check list for the firm making foreign investments. (A4, B14)

211-A. Investment Casting Directory. *Precision Metal Molding,* v. 14, June 1956, p. 85 + 32 pages.

Specifications for 13 investment casting alloys, with product, alphabetical and trade name directories. (A10, E15, S22)

212-A. (German.) **Preparation of Work and Production Planning in a Heavy Plate Rolling Mill.** Helmut Friedrich. *Stahl und Eisen,* v. 76, no. 10, Mar. 19, 1956, p. 599-613.

Importance of the division of work within the organization. Scheduling from the reception of order to dispatch of finished products. Production reports. Rationalization of production planning and control by extended use of punched cards. Diagrams, tables. (A5, F23)

213-A. (German.) **Application of Vacuum Techniques in Metallurgical Research.** R. F. Dickerson and E. L. Foster, Jr., *Vakuum-Technik,* v. 5, no. 3, May 1956, p. 33-38.

Design, operation and use of arc, induction and other types of furnaces for heat treatment and smelting operations. Vacuum techniques can also be adapted to welding, drying and X-ray studies. Diagrams, photographs. (A general)

214-A. Steels and Their Treatment for Engineering. J. G. Ritchie. *Australasian Engineer,* v. 48, Apr. 1956, p. 57-62.

Principles underlying development of various steel types; functions of alloying elements; main types of heat treatment; methods used in metallurgical testing. (A general, J general, ST)

215-A. Process Charts for Foundry Work. F. Gaiger. *British Cast Iron Research Association, Journal of Research and Development,* v. 6, Feb. 1956, p. 142-160 + 10 plates.

Application of process chart technique in simplifying methods of production and improving efficiency. (A5, E general)

216-A. Corrosion Research Laboratories. X. Cables and Wires: BICC Research. R. L. Davies. *Corrosion Technology,* v. 3, June 1956, p. 181-184.

Activities of an industrial research laboratory working on corrosion problems. (A9, R general)

217-A. Process Control in the Plating Shop. K. E. Langford. *Electro-*

plating and Metal Finishing, v. 9, June 1956, p. 177-182.

Operational sequences that can be subjected to some form of control; principal methods of control; frequency of analysis, statistical control. (A5, L general)

218-A. Foundry Teaching and Research at MIT. Howard F. Taylor. *Foundry,* v. 84, July 1956, p. 74-79.

Report of equipment, facilities and curricula available for training engineers and conducting foundry research. (A3, E general)

219-A. Dust and Fume Extraction in Foundries. J. A. Wilkins. *Foundry Trade Journal,* v. 100, May 31, 1956, p. 381-387.

Methods of eliminating dust and fumes in relation to various foundry operations. (A7, E general)

220-A. Problems and Progress in Manufacture and Metallurgy. H. H. Burton. *Iron and Steel Institute, Journal,* v. 183, June 1956, p. 113-123.

Problems involved in shipbuilding, power generation and aeronautical engineering. Future developments necessary to meet engineering requirements for steel. (A general, ST)

221-A. Sir Henry Bessemer, 1813-1898. James Mitchell. *Iron and Steel Institute, Journal,* v. 183, June 1956, p. 179-188 + 4 plates.

The life of Bessemer, development of the Bessemer furnace and its effect on the steel industry. (A2, D3, ST)

222-A. Sir Henry Bessemer, Inventor and Businessman. Georges Delbart. *Iron and Steel Institute, Journal,* v. 183, June 1956, p. 190-195.

Bessemer's invention; steelmaking in a converter; Bessemer the man. (A2, D3, ST)

223-A. When Trouble Comes . . . Shut It Down, or Make Hot Repairs? J. S. Clarke. *Oil and Gas Journal,* v. 54, July 2, 1956, p. 90-92.

List of safe procedures for preparation steps in welding on catalytic cracking units during operation. (A7, K1, ST)

224-A. Some Metallurgical Problems Arising From Stratospheric Flight. P. L. Teed. *Shell Aviation News,* 1956, no. 215, May 1956, p. 14-21.

Problem of stratospheric flight involves evaluation of influence of both low and high temperatures on mechanical properties of the metallic materials of which the aircraft is constructed, depending on whether the machine is to be flown at sub or supersonic speeds. (A general, Q general)

225-A. U. S. Steel Opens New Research Center. *Steel Processing,* v. 42, June 1956, p. 341-343, 350.

Fundamental and applied research laboratories mark important step in improving steelmaking methods and developing new steel and new uses for steels. (A9, ST)

226-A. Steel and Power. *Steel Review,* nos. 3-6, Apr. 1956, p. 1-6.

Supply and consumption of coking coal for the steel industry. (A4, B22, ST)

227-A. The Fire Properties of Metallic Uranium. *U. S. Atomic Energy Commission, TID-*8011, Apr. 1956, 11 p.

Under suitable conditions, uranium is capable of self-sustaining combustion in air, N_2, O_2 and CO_2. Intense, localized heat is emitted. Factors contributing to uranium pyrophoricity. (A7, U)

228-A. Kaiser Expansion to Ladle 450,000 More Tons Into Steel-Hungry West. *Western Metals,* v. 6, June 1956, p. 53-54.

Two 65-ton oxygen converter vessels are among the additions contributing to increased tonnage of nearly 450,000 (A4, D8, ST)

229-A. A Dictionary of Metallurgy. A. D. Merriman and J. S. Bowden. *Metal Treatment and Drop Forging,* v. 23, June 1956, p. 225-232.

Definitions of terms from "solidus" to "spraying (metal)." (To be continued.) (A10)

230-A. How Do You Store Your Patterns? E. J. McAfee. *Modern Castings,* v. 30, July 1956, p. 52-56.

Factors governing space requirements, rules for eliminating old and obsolete patterns, weatherproof storage, shelving and pattern identification considerations. (A5, E17)

231-A. (French.) **French Contribution to Metallurgy.** Paul G. Bastien. *Revue de Métallurgie,* v. 53, no. 5, May 1956, p. 321-331.

Review of the essential discoveries and developments relating to iron and steelmaking, metallurgy of nonferrous metals and alloys, control instruments and the evolution of scientific research in metallography and physics of metals. (A general)

232-A. (Pamphlet.) **The British Iron and Steel Association, Annual Report 1955.** 124 p. Registered Office, 11 Park Lane, London W1, England.

Reports on the work of the various divisions of the association. Photographs. (A9, ST, Fe)

233-A. (Book.) **Annual Statistical Report for 1955.** *American Iron and*

Steel Institute, 136 p. 1956. American Iron and Steel Institute, 150 East 42nd St., New York 17, N. Y.

Statistics concerning employment, coke and coal, blast furnaces, ingots and steel for castings, steel products, exports and imports, ores and production by countries. (A4, ST)

234-A. (Book.) **Proceedings of the Eighth International Congress on Theoretical and Applied Mechanics.** 529 p. 1953. Faculty of Science of the University of Istanbul, Turkey.

Presents condensations or extracts of 336 technical papers in English, French, German and Italian. (A general)

235-A. (Book.) **Metallurgical Thermochemistry. v. I. Metal Physics and Physical Metallurgy.** O. Kubaschewski and E. Ll. Evans. Rev. 2nd Ed. 410 p. 1956. Pergamon Press Ltd., 4-5 Fitzroy Sq., London, W1, England.

Monograph on the science of applied thermodynamics covers theory and technique; shows examples. (A general)

236-A. (Book.) **The European Steel Pipe and Tube Industry.** 103 p., 1955. Industry Division, Economic Commission for Europe. Available from the Sales Section, European Office of the United Nations, Palais des Nations, Geneva, Switzerland. $.60.

Study of the prospects of tube consumption and prices in Europe. (A4, ST)

237-A. (Book.) **Atomic Theory for Students of Metallurgy.** William Hume-Rothery. 3rd Ed. 342 p. 1955. Institute of Metals, 4 Grosvenor Gardens, London, S.W. 1, England. $4.50.

General background, structure of the free atom, assemblies of atoms, free-electron theory of metals, Brillouinzone theory, electrons, atoms, metals and alloys. (A general)

238-A. (Book.)**Engineering Metallurgy.** L. F. Mondolfo and Otto Zmeskal. 1955, 397 p. McGraw-Hill, 330 W. 42 Street, New York, 36, N. Y. $8.00.

A college text for engineers whose primary interests are not in the metallurgical field. Emphasis is on theoretical reasons behind the operations. (A general)

239-A. (Book.) **Mineral Facts and Problems.** *Bureau of Mines Bulletin* 556. 1042 p. 1956. U. S. Department of the Interior. Available from the U. S. Government Printing Office, Washington, D. C. $5.75.

Comprehensive survey of production, consumption and the general economic and technologic positions of metals, alloys, ores, coal, petroleum, minerals and their allied industries. (A4)

240-A. Dephenolizing With Centrifugal Extractors. Walter J. Podbielniak and Herbert R. Kaiser. *Blast Furnace and Steel Plant,* v. 44, July 1956, p. 760-764.

A centrifugal, countercurrent, multistage solvent extractor is applied to the removal of phenols from waste liquors of coke oven operations. (A8, B18)

241-A. Induction Heating Handling Problems. D. Warburton Brown. *Welding and Metal Fabrication,* v. 24, July 1956, p. 256-261.

Mechanisms for obtaining linear motion; main types of handling fixtures. (A5, J2)

242-A. (French.) **Tour of the Aluminum World.** G. A. Baudart. *Revue de l'Aluminium,* v. 33, no. 232, May 1956, p. 459-464.

Tabulates and discusses European aluminium potential by country. (To be continued.) (A4, A1)

243-A. (Polish.) **The Relation Between Production Costs and the Metal Content of a Concentrate.** Wlodzimierz Stepinski. *Archiwum Gornictwa,* v. 1, no. 2, 1956, p. 199-222.

For lowest total production costs of a ton of metal there is a well-defined optimum figure for the average metal content of the concentrate. Increasing or decreasing this average content increases total costs. Figures and formulas for determining optimum content given. (A4, B14)

244-A. (Spanish.) **The Use of Soft Scrap Iron in a Medium-Size Cupola.** Emerico Ehrenstein Pollak. *Instituto del Hierro y del Acero,* v. 9, no. 46, May 1956, p. 536-540; disc., p. 540-542.

Melting tests using soft scrap iron obtained from production processes as a substitute for ingots. (A8, E10, Fe)

245-A. (Swedish.) **Design of Foundry Buildings.** E. O. Lissell. *Gjuteriet,* v. 46, no. 4, Apr. 1956, p. 53-57.

Factors governing layout of foundries, data relating to floor area and dimensions and construction requirements. (A5, E general)

246-A. The Functions and Education of Welding Engineers. *British Welding Journal,* v. 3, July 1956, p. 275-297.

Educational facilities in France, Germany and the United States. The work of the International Institute

of Welding on welding instruction. Some proposals for improving higher education in welding. (A3, K general)

247-A. Arc Welding Costs: An Example of Shop Work Measurement. A. G. Thompson. *British Welding Journal,* v. 3, July 1956, p. 306-322.

Work measurement tests were made on arc welded joints during the manufacture of transformer tanks and allied fabrications. Production data analyzed so the accuracy of cost relations might be assessed. (A4, K1)

248-A. Some Economic Aspects of Corrosion. A. Keynes. *Corrosion Technology,* v. 3, July 1956, p. 226-227.

General economic analysis. (A4, R general)

249-A. Treatment of Plating Shop Effluent. J. Lakin. *Electroplating and Metal Finishing,* v. 9, July 1956, p. 221-224.

Discussion of improved flow system of treatment with sulfur dioxide and chlorine, with particular reference to the chemical engineering considerations involved in a new British effluent treatment plant. (A8, L17)

250-A. Scrap Investigation. J. McGrandle. *Foundry Trade Journal,* v. 101, July 5, 1956, p. 5-16.

Information on how to collect data on scrap castings and how to analyze them. Possible ways of using this information. (A8, E10)

251-A. Engineering Enrollment. W. B. Plank. *Journal of Metals,* v. 8, July 1956, p. 827.

Undergraduate and graduate student enrollment in all branches of engineering. (A3)

252-A. The Industry in the World Today. *Light Metals,* v. 19, July 1956, p. 207-210.

Position of Canadian aluminum industry in the light of recent and contemporary developments, particularly in its main markets in the United States and England. (A4, Al)

253-A. 1955 Western Europe Primary Zinc Use Rose to 925,000 Metric Tons From 690,000 Tons in '52. R. L. Stubbs. *Metals (Daily Metal Reporter Monthly Supplement),* v. 27, July 1956, p. 9-10, 19.

Trends in consumption and production during past three years; prediction for the future. (A4, Zn)

254-A. Selling Aluminum. E. A. Farrell. *Modern Metals,* v. 12, July 1956, p. 76 + 9 pages.

Operation of aluminum company's sales division. Present and potential products and markets. (To be continued.) (A4, Al)

255-A. Report From Europe. *Modern Metals,* v. 12, July 1956, p. 44, 48, 50, 52.

Production, consumption and applications of light metals in various European countries. (A4, EG-a)

256-A. Non-Ferrous Metals Research. *Product Finishing,* v. 9, June 1956, p. 79-80.

Investigations by British research organization into various phases of electrodeposition, galvanizing and other finishing processes. (A9, L17, L16)

257-A. Chromium Recovery From Plating Solutions. W. S. Morrison. Paper from "Ion Exchange Technology", Academic Press Inc., p. 321-339.

Theoretical and applied considerations; an anion exchange system. (A8, L17, Cr)

258-A. (Czech.) **Present-Day Views on the Dangers of Electric Welding to Health and Hygienic Working Conditions.** Vladimir Cirman. *Zvaranie,* v. 5, no. 4, Apr. 1956, p. 120-123.

Dangers from several methods of arc welding and from resistance welding. Medical findings on eye, skin, respiration illnesses and "welders' neurosis". Methods of protecting the workers. (A7, K1, K3)

259-A. (French.) **Sir Henry Bessemer, a Great Inventor and a Business Man.** Georges Delbart. *Revue de Métallurgie,* v. 53, no. 6, June 1956, p. 401-410.

The life and numerous inventions of Bessemer. History of the invention of the conversion process. Present development of the Bessemer-Thomas process. (A2, D3, ST)

260-A. (Italian.) **Manufacturing Cost of Wrought Iron, Openhearth and Electric Processes.** *Metallurgia Italiana,* v. 48, no. 5, May 1956, p. 193-258.

Comparative economic study of above processes in the Italian steel industry. (A4, D2, D5, D8, Fe-m)

261-A. (Swedish.) **Progress in the Field of Metallurgy and Metal Finishing.** Edy Velander. *Teknillisen Kemian Aikakausilehti,* v. 13, no. 10, June, 1956, p. 283-284, 287-288.

Recent developments in powder metallurgy, flame spraying, ceramic coatings and other new finishing techniques. Titanium developments, vacuum casting of steel, production

of rhenium and the increasing use of selenium and germanium. Manufacture of sulfite pulp digesters of sandwich construction.
(A general, H general, L general, Re, Ge, Se)

262-A. Metallurgical Library Pays Its Own Way. M. O. Baker. *Iron Age,* v. 178, Aug. 2, 1956, p. 96-98.

Based on average needs of 20-man research-team company, initial and operating costs are broken down and rated against present methods.
(A general)

263-A. A Dictionary of Metallurgy. A. D. Merriman and J. S. Bowden. *Metal Treatment and Drop Forging,* v. 23, July 1956, p. 273-280.

From "spray quenching" to "stress-strain diagram". (A10)

264-A. What to Look for in a Plant Site. James R. Allan. *Modern Castings,* v. 30, Aug. 1956, p. 49-53.

Some considerations are zoning, meterological factors, freedom from floods, transportation facilities, electric power and water supplies, availability of workers and character and price of land. (A5)

265-A. (Polish.) **Nonferrous Metals and Alloys.** E. Kamienski. *Przeglad Techniczny,* v. 77, June 1956, p. 245-246.

Great growth in use of aluminum, due to increased use in construction and as a replacement for copper wire. Aluminum alloys have great strength in relation to weight. Magnesium use is restricted by cost and low corrosion resistance. Some comments on titanium, beryllium and tin included.
(A4, T26, Al, Cu, Mg, Ti, Be, Sn)

266-A. (Pamphlet.) **The Outlook for the Steel Industry and Its Implications for the Economy.** Willian H. Lowe. 19 p. 1956. Institute of Investment Banking, Philadelphia, Pa.

Trends in production, consumption, prices and operating costs. Graphs, diagram. (A4, ST)

267-A. (Book) **Quin's Metal Handbook, 1955.** 719 p. 1955. K. V. Henderson, editor. Metal Information Bureau, Limited, Birkett House, 27 Albemarle St., London, W.1, England.

Statistics, price records, and miscellaneous information useful to those dealing in raw, semi-finished, and fabricated metals, and metallic ores. (A4)

267-A. Some Achievements of Modern Metallurgy. Howard K. Worner. *Australasian Engineer,* v. 48, June 1956, p. 58-63.

Significant achievements include production of tremendous tonnages, new production techniques, new industrial metals, improved properties in "old" metals, and advances in melting, casting, heat treatment, fabrication, finishing and testing.
(A general)

268-A. Inland Steel's Program of Expansion to Increase Capacity by 1959 to 6,000,000 Tons. Charles Longenecker. *Blast Furnace and Steel Plant,* v. 44, Aug. 1956, p. 884-927, 930 + 4 plates.

Survey of plant's complete operations. (A5, ST)

269-A. The History of Magnesium. C. J. P. Ball. *Institute of Metals, Journal,* v. 84, July 1956, p. 399-411 + 2 plates.

Historical survey of progress of magnesium from its discovery. Production processes used in various countries, types of alloys.
(A2, C general, Mg)

270-A. Thirteenth Century Smelting Residues From Kirkstall Abbey. R. Haynes. *Iron and Steel Institute, Journal,* v. 183, Aug. 1956, p. 359-361.

Residues from the smelting of bronze, iron and lead are described.
(A2, Cu, Fe, Pb)

271-A. Review of the Metal-Cutting Analyses of the Past Hundred Years. I. Finnie. *Mechanical Engineering,* v. 78, Aug. 1956, p. 715-721.

Historical survey includes 71 references. A basic relationship between the various variables in metal cutting is still lacking. (A2, G17)

272-A. What Can Production-Function Analysis Do for the Metallurgical Industry. Norman R. Gardner, Jack D. Wolf and Amos J. Shaler. *Microtecnic (English Ed.),* v. 10, no. 2, 1956, p. 65-70.

Examples of production functions. Development of a production function for the blast furnace.
(A4, A5, D1)

273-A. The Treatment of Metal Plating Wastes at Sperry's Gainesville, Florida Plant. Fred A. Eidsness and Paul B. Bergman. *Plating,* v. 43, Aug. 1956, p. 1005-1007.

Design and operation of demineralization and waste treatment plant. (A8, L17)

274-A. Planning Can Reduce Waste Treatment Costs. F. L. Neff. *Plating,* v. 43, Aug. 1956, p. 1008-1011.

Factors affecting choice of a treatment scheme in applying the alkaline chlorination method. (A8, L17)

275-A Profitable Recovery of Plating Wastes by Reconcentration of Re-

duced Volume Rinses. K. Odland and J. C. Hesler. *Plating,* v. 43, Aug. 1956, p. 1022-1025.

Reduced rinse flows resulting from efficient countercurrent rinsing practice now make feasible the application of evaporation equipment for complete recovery of drag-out losses, thereby eliminating destruction costs, and reclaiming valuable metals. Applications to recovery of metallic cyanides and chromic acid illustrated. (A8, L17, Cr)

276-A. Semi-Annual Summary Research Report in Metallurgy. *Ames Laboratory (U. S.. Atomic Energy Commission),* ISC-708, May 1956, 37 p.

Purification, separation and metal preparation studies, preparation of pure compounds, alloy systems, metal coatings and corrosion, solid state investigations, rare earth metallurgy. (A general)

277-A. Guide to Alkali Metals Handling. W. W. Kendall, L. H. B. Peer, W. J. Scheiber and F. C. Steiner. *Knolls Atomic Power Laboratory (U. S. Atomic Energy Commission),* AECU-3143, July 1954, 32 p.

Personal safety equipment, fire prevention and fire fighting, emergency panels, storage of liquid metals, disposal and cleaning, handling of radioactive metals. (A7, EG-e)

278-A. Titanium Plant at Boulder City, Nev.: Operating Costs. C. T. Baroch and T. B. Kaczmarek. *U. S. Bureau of Mines, Report of Investigations* 5248, July 1956, 21 p.

Summary of cost data for 15 months includes raw materials, labor and supervision, supplies, utilities, direct overhead depreciation of building and equipment, administrative overhead and capital costs. (A4, C4, Ti)

279-A. Cyanide and Chromium Recovery From Plating Wastes. Louis Weisberg and E. J. Quinlan. *Sewage and Industrial Wastes,* v. 28, Aug. 1956, p. 998-1008.

Waste treatment to recover most of the so-called waste materials in useful form instead of destroying them. (A8, L17, Cr)

280-A. (German.) The Importance of the Rare Metals in Modern Techniques. Willy Schreiter. *Neue Hütte,* v. 1, no. 7, July 1956, p. 381-389.

The influence of small amounts of rare-metal alloying elements upon the properties of metals and alloys; applications in atomic energy. (A general, B22, EG-b)

281-A. (German.) Contribution to the Previous and Early History of the Bessemer Process. Herbert Dickmann. *Stahl und Eisen,* v. 76, no. 16, Aug. 9, 1956, p. 1020-1024.

The "Schleidener Tal" process and the refining process of W. A. Lampadius, the forerunner of Bessemer, is described. (A2, D3, ST)

282-A. A Dictionary of Metallurgy. St-Ta. A. D. Merriman and J. S. Bowden. *Metal Treatment and Drop Forging,* v. 23, Aug. 1956, p. 315-322.

From "Straits Tin" to "Taurus Bronze". (To be continued.) (A10, Sn, Cu)

283-A. The Foundry's Attack on Air Pollution. *Modern Castings,* v. 30, Sept. 1956, p. 33-48.

General picture of the air pollution problem includes legislation, community relations, sources, sampling and analysis and control equipment. (A8, E general)

284-A. (Book.) **Year Book of the American Bureau of Metal Statistics for 1955.** v. XXXV. 127 p. 1956. American Bureau of Metal Statistics, 50 Broadway, New York, N. Y. $3.00.

Tabulated data on copper, lead, zinc, gold, silver, aluminum, and other miscellaneous metals. (A4, EG-a)

285-A. Emissions From Cupolas. F. M. Shaw. *Foundry Trade Journal,* v. 101, Aug. 30, 1956, p. 217-228.

Types of dust collectors for use on cupolas; factors affecting cupola dust and fume emission; methods of separating dust from cupola gases. (A8, E10)

286-A. Damaging Effects of Radiation on Solid Reactor Materials. J. H. Kittel. *Nucleonics,* v. 14, Sept. 1956, p. 63-65.

Important effects which influence properties of moderators, and structural, control and shielding materials. (A general)

287-A. Beneficial Effects of Radiation on Metals. H. A. Saller. *Nucleonics,* v. 14, Sept. 1956, p. 86-88.

Beneficial effects of radiation on metals considered under two conditions: continuous irradiation as a reactor material, and deliberate exposure to radiation to improve selected properties. (A general)

288-A. Steel Expansion Rolls Along. *Steel,* v. 139, Sept. 17, 1956, p. 134-136.

Data on steel ingot capacities and where they are being increased. Other expansion projects and related costs. (A4, ST)

289-A. Papers Prepared for Radiation Effects Review Meeting, Congress Hotel, Chicago, July 31—August 1, 1956. *U. S. Atomic Energy Commis-*

sion, TID-7515, pt. 1, Aug. 1956, 48 p.

Papers deal with effects of high energy electrons and radiation damage observations at the Materials Testing Reactor. (A general)

290-A. The Foundry Industry in Australia. A. W. Silvester. *Institute of British Foundrymen*, v. 48, p. 287A-304A; disc., p. 304A-305A.

Relation of foundry industry to country's basic structure and economy, basic material and power resources, typical foundry conditions, future development. (A4, E general)

291-A. (Swedish.) **Dust Measurement for Control of Foundry Atmospheres.** A. Ahlmark and H. Ohman. *Gjuteriet*, v. 46, no. 8, Aug. 1956, p. 101-105.

Silicosis is mainly dependent on the concentration of dust and the time of exposure. Its occurrence at different stages among foundry workers with different jobs is treated. (A7, A8, E general)

292-A. Less Common Metals. E. M. Sherwood. *Industrial and Engineering Chemistry*, v. 48, pt. 2, Sept. 1956, p. 1735-1741.

A current review concerning the technology of zirconium, hafnium, molybdenum, tantalum, niobium, rhenium and "ductile" chromium. Achievements in this field in improved refining methods, protective coatings, processing techniques, alloy development. (A general, Zr, Hf, Mo, Ta, Cb, Re, Cr)

293-A. High-Vacuum Metallurgy. *Nuclear Engineering*, v. 1, Sept. 1956, p. 252-254.

Design and operation of various furnaces. (A general)

294-A. Trends in Metallurgical Research in the United States. Edgar C. Bain. *Steel Processing*, v. 42, Sept. 1956, p. 517-521, 530-531.

Trends in studies of brittle fracture, zone melting and physical chemistry of steelmaking. (A general, ST)

295-A. (French—German.) **Rational Handling of Scrap From Heavy Nonferrous Metals.** Willy Affolter. *Pro-Metal*, v. 9, no. 52, Aug. 1956, p. 707-712.

Problem of returning metallic scrap from customers to smelting works. A new type of receiver. Transportation problems and critical review of present conditions. (A8, EG-a)

296-A. (German.) **Safeguards for the Prevention of Accidents in the Die-Casting Foundry.** Gustav Lieby. *Giesserei*, v. 43, no. 18, Aug. 30, 1956, p. 548-557.

General safeguards, measures for accident prevention in use of melting and holding furnaces. (A7, E13)

297-A. (German.) **Full-Automatic Conveying Systems for the Production of Cast Heating Radiators With Modern Charging and Hot-Blast Cupola Plants.** Franz Grosser and Otto Reif. *Giesserei*, v. 43, no. 18, Aug. 30, 1956, p. 463-473.

Plant layout and mechanized conveying lines for two sizes of radiators. (A5, E general, CI)

298-A. (German.) **Dust Problems in Foundries.** Kurt Guthmann. *Giesserei*, v. 43, no. 18, Aug. 30, 1956, p. 572-579.

Legal and official contamination control measures, sources of dust, data on dust deposition from various industries including the metallurgical plants. (A7, E general)

299-A. (Polish.) **Preliminary Investigation of Ancient Metallurgical Slags Accumulated in Some Regions of Poland.** Stanislaw Holewinski. *Archiwum Hutnictwa*, v. 1, no. 3, 1956, p. 251-282 + 4 plates.

Probably Polish activities are related to finds in other regions of Europe and North America. (A2, B21, Fe)

300-A. (Polish.) **New Methods of Briquetting Cast Iron Turnings for the Cupola Process.** Jerzy Niemiec. *Przeglad Odlewnictwa*, v. 6, no. 8, Aug. 1956, p. 241-242.

Cheap, simple process of briquetting scrap from turning cast iron. Briquettes 100 × 140 mm. in size are formed in a molding machine. Turnings are mixed with water, cement and lime before molding. (A8, E10, CI)

301-A. A Dictionary of Metallurgy. A. D. Merriman and J. S. Bowden. *Metal Treatment and Drop Forging*, v. 23, Sept. 1956, p. 367-374.

From "Taylor process" to "thermodynamic laws". (To be continued.) (A10)

302-A. (Czech.) **New Directions in the Manufacture of Semi-Finished Products and Nonferrous Metals.** Jiri Chvojka. *Hutnik*, v. 6, no. 8, Aug. 1956, p. 243-248.

Progress achieved in nonferrous metallurgy includes introduction of new ores and alloys, new technological processes, fabrication of complex shapes. Economic factors. (A4, EG-a)

303-A. (Book.) **Conference on Foundry Ventilation and Dust Control.** 257 p. 1956. The British Cast Iron Research Association, Alvechurch, Birmingham, England. $10.00.

Sixteen papers show that many difficult problems affecting health and safety in foundries are now well on the way to being mastered. (A8, E general)

304-A. (Book.) **Treatise on Inorganic Chemistry. v. II. Sub-Groups of the Periodic Table and General Topics.** H. Remy. (Translated from the German by J. S. Anderson.) 800 p. 1956. Elsevier Publishing Co., 155 E. 82 St., New York, N. Y. $17.00.

Designed as a comprehensive text setting out the subject in its present state of development, covering the whole of the factual material, and to bring it into proper relationship with the relevant thermodynamic, kinetic and structural data. (A general)

305-A. The British Iron and Steel Research Association. *Metallurgia,* v. 54, no. 324, Oct. 1956, p. 166-172, 182.

Review of present studies on phases of iron and steelmaking. Problems for future research. (A9, ST)

306-A. The Equipment of the British Non-Ferrous Metals Research Association. E. C. Mantle. *Metallurgia,* v. 54, no. 324, Oct. 1956, p. 173-177, 182.

Facilities available to the Research Association. New uses have been found for old-established pieces of metallurgical apparatus. (A9, EG-a)

307-A. The British Steel Castings Research Association. A. H. Sully. *Metallurgia,* v. 54, no. 324, Oct. 1956, p. 178-182.

New research station, research in metallurgy, foundry practice and molding materials, steelmaking, plant engineering, industrial health. (A9, CI)

308-A. Recycling Uranium Scrap. Charles G. Manley. *Mines Magazine,* v. 46, Sept. 1956, p. 61 + 6 pages.

Opportunities in recovery of reactor fuel-fabrication scrap. (A8, U)

309-A. A Preliminary Study of the Pyrophoric Properties of Zirconium Machinings and Standard Warning Labels for Zirconium. W. W. Allison. *Westinghouse Electric Corporation, Atomic Power Division, U. S. Atomic Energy Commission WAPD-TM-14,* Sept. 1956, 13 p.

Study made to obtain immediate rules of thumb and indications of possible lines for fruitful research. (A7, G17, Zr)

310-A. (Italian.) **Constitution of Slags Coming From Lead Furnaces.** F. Massazza. *Metallurgia Italiana,* v. 48, no. 9, Sept. 1956, p. 406-408.

Determination of components required chemical, metallographic, petrographic and X-ray tests. Main components are minerals of the olivine and melilite groups, wurtzite, spinels, magnetite, wüstite and glass. (A8, B21, S11, Pb)

311-A. (Russian.) **Appraisal of Working Conditions in Various Types of Arc Welding.** E. I. Vorontsova and T. S. Karacharov. *Svarochnoe Proizvodstvo,* no. 9, Sept. 1956, p. 12-14.

A general review, from the standpoint of health protection, of working conditions in manual arc welding, automatic and semi-automatic welding under flux, and automatic carbon dioxide-shielded welding. Suggests some health protection measures with respect to the airing of working places. (A7, K1)

312-A. A Dictionary of Metallurgy. A. D. Merriman and J. S. Bowden. *Metal Treatment and Drop Forging,* v. 23, Oct. 1956, p. 405-412.

From "thermodynamic scale" to "Tophet". (To be continued.) (A10)

313-A. Accident and Fire Prevention Information. *U. S. Atomic Energy Commission,* TID 5365, Aug. 1956, 30 p.

Summaries of a number of accidents from zirconium metals, giving recommendations for future safe handling. (A7, Zr)

314-A. Steel Production in Latin America. Georg Bulle. Paper from "A Study of the Iron and Steel Industry in Latin America". v. II. United Nations, p. 293-303.

Comparison of possible steelmaking processes; layout of Latin American steelworks; production data; raw material requirements. (A4, A5, D general, ST)

315-A. The Balance of Materials and the Economic Comparison of the Different Steelmaking Processes. Ernst Krebs. Paper from "A Study of the Iron and Steel Industry in Latin America". v. II. United Nations, p. 303-315, 320-330.

Operational economies are compared, based on the material balance-sheet per ton of crude steel. (A4, D general, ST)

316-A. Comparative Investment Costs for Different Steelmaking Processes. Charles F. Ramseyer. Paper from "A Study of the Iron and Steel Industry in Latin America". v. II. United Nations, p. 316-327, 330-331.

Study of the relative capital investments required to make steel by different processes. Includes production costs and plant and equipment requirements. (A4, ST)

317-A. Selection of Steelmaking Processes and of Locations for Integrated Iron and Steel Works. Wm. A. Haven. Paper from "A Study of the Iron and Steel Industry in Latin America". v. II. United Nations, p. 347-358, 365-366.

Raw materials, markets, transportation, fuel and labor aspects. (A4, D general, ST)

318-A. (Polish.) **Application of the Electrolysis of Zincates for Recovering Zinc From Zinciferous Wastes.** W. Rutkowski and B. Winsch. *Prace Instytutow Ministerstwa Hutnictwa,* 1956, no. 3, 1956, p. 163-166.

Zinc is recovered from the cinders of a dust trap on a copper shaft furnace with an efficacy of 93 to 94%. (A8, C23, Zn)

319-A. (Russian.) **Damascus Steel and Modern Iron-Carbon Alloys.** I. S. Gaev. *Metallovedenie i Obrabotka Metallov,* no. 9, Sept. 1956, p. 17-24.

Mechanical properties of Damascus steel, possibility of reproducing some of them in modern mass-produced iron-carbon alloys. (A2, ST)

320-A. (Book.) **Uranium and the Atomic Industry.** Oliver Townsend and James Greene, editors. 183 p. 1956. Atomic Industrial Forum, Inc., 3 East 54th St., New York 22, N. Y.

Production, American industry as related to international program, demands for energy, AEC program and policies, competitive sources, developments in Canada. (A general, U)

321-A. (Book—German.) **Ores and Metals. Statistics.** 156 p. 1956. *Minerais et Métaux,* 61 Avenue Hoche, Paris, 8 France.

World statistics for the years 1935 to 1938, and 1948 to 1955 concerning copper, lead, zinc, tin, antimony, cadmium, cobalt, nickel, aluminum, magnesium, mercury, silver and gold. (A4)

322-A. (Book—Spanish, French, English, German and Italian.) **Twenty-Eighth International Congress of the Chemical Industry.** v. I-II. 1479 p. 1955 p. Saez, Buen Suceso 14, Madrid, Spain.

A collection of information transacted at the Congress, and of lectures and articles on researches and studies performed in Spain and abroad in the fields of chemistry, nuclear chemistry, metallurgy, etc., and various industrial products. Pertinent papers abstracted separately. (A general)

SECTION B

RAW MATERIALS and ORE PREPARATION

1-B. Metallurgical Coke in Canada. J. R. Wallace, E. P. Duchemin and William Snow. *Canadian Mining and Metallurgical Bulletin,* v. 48, no. 522, Oct. 1955, p. 654-662; *Canadian Institute of Mining and Metallurgy, Transactions,* v. 58, 1955, p. 384-392.

Deals specifically with the coal, coke and smelting problems in Nova Scotia. Map, tables, graphs, diagrams, photographs. 9 ref. (B22)

2-B. (French.) **The Mineral Resources of Egypt.** Mohammed Ezz El-Din El-Zoghby. *Revue de l'industrie minérale,* v. 36, no. 630, Oct. 1955, p. 1072-1082.

General review of mineral deposits and developmental possibilities. Map. (B10, Au, Cu, Zn, Pb, Mn, Fe)

3-B. (German.) **The Use of Fuel Oil in an Integrated Steelworks.** Hans Weineck. *Stahl und Eisen,* v. 75, no. 21, Oct. 20, 1955, p. 1375-1383.

Consequence of coke oven gas shortage, use of oil is explained. Diagrams, graphs, photographs, tables. 6 ref. (B18, ST)

4-B. How Manganese, Inc., Upgrades Complex Three Kids Ore. J. B. Huttl. *Engineering and Mining Journal,* v. 156, Nov. 1955, p. 88-93.

Manganese, Inc.'s plant near Henderson, Nev., upgrades a complex manganese ore by flotation and produces high-grade nodules from those concentrates. Flowsheet, photographs. (B14, Mn)

5-B. How Synthetic Flocculants Help the Mill Operator. D. J. Pye. *Engineering and Mining Journal,* v. 156, Nov. 1955, p. 94-96.

Sparan 2610 decreases necessity of large settling areas and heavy filtration equipment. Four case histories. Graphs, table, diagram. (B14)

6-B. Effect of Sinter Mix Composition and Additives on the Quality of Blast Furnace Sinter. E. C. Rudolphy, C. W. Boquist and D. J. Carney. *Journal of Metals,* v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Nov. 1955, p. 1179-1189.

Determines changes in strength, bulk density, chemical composition, microstructure and feed permeability. Tables, graphs, micrographs, photographs. 14 ref. (B16, D1, Fe)

7-B. Production and Purification of $TiCl_4$. L. W. Rowe and W. R. Opie. *Journal of Metals,* v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Nov. 1955, p. 1189-1193.

Brief history, classifies chlorinator feed materials, discusses thermodynamics and kinetics of production, outlines problems. Graphs, tables. 23 ref. (B14, C4, Ti)

8-B. History and Trends of the Uranium Plant Flowsheet. A. Q. Lundquist and J. L. Lake. *Mining Congress Journal,* v. 41, Nov. 1955, p. 37-42.

Extraction of uranium dating back to 1900, traced through all its stages to the most modern plants. Photographs, flowsheets, table. (B14, U)

9-B. Iron Ores: Some Considerations on Their Availability, Properties, and Usage. D. Joyce and B. Marsden. *Canadian Mining and Metallurgical Bulletin,* v. 48, no. 523, Nov. 1955, p. 727-732; *Canadian Institute of Mining and Metallurgy, Transactions,* v. 58, 1955, p. 427-432.

Includes graph, tables. 6 ref. (B general, Fe)

10-B. The Industry of Aluminium Compounds. Geoffrey Martin. Paper from "Industrial & Manufacturing Chemistry. Pt. II. Inorganic". v. II. Philosophical Library, Inc., p. 49-58.

Manufacture, properties, uses of alumina, aluminum hydroxide and

aluminum sulfate. Tables. 10 ref. (B general, C general, Al)

11-B. (German.) **Investigations on the Properties of Blast Furnace Coke.** Hermann Schenck and Hans Esch. *Stahl und Eisen,* v. 75, No. 22, Nov. 3, 1955, p. 1421-1425.

Mechanical, thermal, chemical attack to be endured by the coke; effect of a pure compression load with different initial particle sizes and loads; determination of strength by means of the portion of the coke remaining undeteriorated and of the work required for its crushing. Graphs. 26 ref. (B18, D1)

12-B. (Russian.) **Conditions for Accelerating the Sintering of Bessemer and Openhearth Manganese Agglomerates.** T. A. Kramnik and N. I. Nechesova. *Stal',* v. 15, no. 10, Oct. 1955, p. 880-886.

Coke fines and culm used as fuel to speed up rate of agglomeration, introduction of lime into the charge, optimum recovery quantities. Effectiveness of method decreases with any sizable additions of coarse-grained recovered material, which tends to segregate into the lower strata of the charge. Tables, graphs. (B16, Fe)

13-B. (Russian.) **New Methods of Testing Mechanical Properties of an Agglomerate.** N. Z. Plotkin, G. G. Oreshkin and A. K. Rudkov. *Stal',* v. 15, no. 10, Oct. 1955, p. 887-891.

Instead of drum or barrel testing of agglomerate, a method of repeated shaking is recommended; factors considered include number of shakes, size of screen mesh, quantity and size of nodules on screen; relation of composition and mechanical properties of agglomerate to oxygen content in charge. Diagrams, tables, photograph, graphs. (B16, Q general, Fe)

14-B. (Book.) **Metallurgical Progress-2.** 71 p. 1955. Philosophical Library, 15th East 40th St., New York 16, N. Y.

Papers on preparation of ores, electric steel production, and nonmetallic inclusions.
(B general, D5, D9)

15-B. Preparation of Ores. J. M. McLeod. Paper from "Metallurgical Progress—2". Philosophical Library, p. 6-32.

Methods of improving blast furnace burdens, sintering of iron ores, theory of sintering and testing materials, other methods of agglomerating fines and direct smelting processes. 220 ref. (B16, D1, Fe)

16-B. (Italian.) **Testing Strength of Refractories by Sudden Thermal Changes.** A. Giannone and L. Massimilla. *Metallurgia italiana,* v. 47, no. 10, Oct. 1955, p. 461-464.

A number of tests similar to those practiced in America carried out on silica, magnesia and silico-alumina bricks. Graphs, photographs, tables. 3 ref. (B19)

17-B. Difficult Classification Problems Solved With the Dutch State Mines Cyclone. R. E. Hochscheid. *Chemical, Metallurgical & Mining Society of South Africa, Journal,* v. 56, Nov. 1955, p. 197-204.

Four series of laboratory and plant tests. The test should serve as approximate guides to cyclone diameter, feed pressure and capacity, for other classifications involving viscous feeds or fine separations. Photographs, diagrams, tables. 1 ref. (B13)

18-B. The Cyclone as a Gold Concentrator. J. H. French. *Chemical, Metallurgical & Mining Society of South Africa, Journal,* v. 56, Nov. 1955, p. 205-211.

Cyclone employs quieter and less turbulent conditions of flow, which allow freer movement of the fine gold particles through the pulp to the concentrate zone. Tables, graphs. (B14, Au,)

19-B. Special Refractories for Use Above 1700° C. O. J. Whittemore, Jr. *Industrial and Engineering Chemistry,* v. 47, Dec. 1955, p. 2510-2512.

Properties, applications and limitations of pure oxide refractories. Special refractory development is also concentrating on the refractory carbides, borides and nitrides. Tables, photographs. 12 ref.
(B19, Al, Mg, Zr)

20-B. Pressure Hydrometallurgy. P. M. J. Gray. *Reviews of Pure and Applied Chemistry,* v. 5, Sept. 1955, p. 194-216.

Developments in chemistry and processes of pressure leaching and pressure precipitation. 46 ref. (B14)

21-B. Engineering Features of Uranium Plant Design. I. S. Craib. *South African Mining and Engineering Journal,* v. 66, pt. 2, Nov. 26, 1955, p. 457 + 5 pages.

Basic process of extracting uranium oxide from the gold-bearing reefs of South Africa; major equipment used in corrosion and abrasion protection; estimates final capital cost and power consumption. Diagrams, photographs, flowsheet, table. (To be continued.)
(B general, C general, U)

22-B. Concentration Tests of Selected California-Nevada Manganese Ores. A. L. Engel, H. J. Heinen, Ed-

ward Morrice and E. S. Shedd. *U. S. Bureau of Mines, Report of Investigations* 5163, Oct. 1955, 12 p.

Results indicate possible treatment methods or limitations of these methods. Only simple treatments were attempted, such as might be feasible for small operations. Information reported is of interest in the present or future development of ores of these types in their respective localities. Tables. (B14, Mn)

23-B. (Russian.) **Viscosity of Primary and Final Blast-Furnace Slags in Melting of Ferro-Alloys in Blast Furnace.** N. L. Zhilo and L. M. Tsylev. *Izvestiia akademii nauk SSSR, otdelenie tekhnicheskikh nauk,* 1955, no. 10, Oct., p. 90-106.

Viscosity-temperature relation for manganese and other slags, from literature and these tests; effect of calcium sulfide, in final slags, on temperature and crystallization rate of slags. Calcium in initial slags impedes process of silicon reduction. Tables, graphs, diagrams. 17 ref. (B21, D1, Fe)

24-B. (Russian.) **Intensification of Enrichment of Magnetite Quartzites.** V. I. Karmazin. *Stahl',* v. 15, no. 11, Nov. 1955, p. 969-976.

Comparative analysis of magnetic separation and flotation, indices of enrichment; cost of operation. Tables, graphs, diagrams, micrograph. 10 ref. (B14, Fe)

25-B. (Spanish.) **Beneficiation of Manganese Ores. Ferromanganese Requirements of the National Steelmaking Industry.** Bernabé Chavarri. *Institutio del hierro y del acero,* v. 8, no. 38, July-Sept. 1955, p. 384-397.

Thermodynamic interpretation of the MnO reduction by carbon. Blast and electric-furnace production of ferromanganese. Graphs, diagram. (B14, D5, P12, Mn)

26-B. (Spanish.) **Obtaining Sulfur, Iron and Other Metals From Pyrite.** Otto Barth. *Institutio del hierro y del acero,* v. 8, no. 38, July-Sept. 1955, p. 406-416.

Preparation of pyrite, chemical transformation processes, roasting, sintering, volatilization, other methods. Tables, graph, diagrams. (B15, B16, Fe)

27-B. Studies in the Recovery of Uranium From Carbonate Solutions. I. Precipitation With Caustic Soda. D. V. Bhatnagar and T. K. S. Murthy. *Journal of Scientific & Industrial Research,* v. 14, sec. B, Nov. 1955, p. 572-576.

Effect of varying the concentrations of sodium hydroxide, sodium carbonate, uranium, phosphate and vanadate, and of temperature on the precipitation of uranium from carbonate solutions. Graphs, table. 7 ref. (B14, U)

28-B. Quemont Mill. *Mine & Quarry Engineering,* v. 22, Jan. 1956, p. 16-21.

Gold concentrating procedures. Photographs, flowsheet. 1 ref. (B14, Au)

29-B. Design and Operation of Callow-Type Flotation Cells at Kennecott's Hayden Concentrator. G. P. Sewell. *Mining Engineering,* v. 7, Dec. 1955, p. 1112-1114.

Equipment and methods. Diagrams, tables. (B14, Cu)

30-B. Fluorochemical Collectors in Flotation. Strathmore R. B. Cooke and Eugene L. Talbot. *Mining Engineering,* v. 7, *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 202, Dec. 1955, p. 1149-1152.

Reagents for nonsulfide ores and for sulfide systems; contact angle measurements. Tables, graphs. 13 ref. (B14)

31-B. A Study of the Factors Affecting the Efficiency of Carbonate Leaching. C. J. Hoffman, W. I. Watson and I. F. Schwien. *Western Laboratories Arthur D. Little, Inc. (U. S. Atomic Energy Commission),* RMO-2617, Mar. 1955, 34 p.

Fineness of ore particle size and maintenance of suitable oxidizing conditions in the leach solution influence the extent of uranium extraction by a sodium carbonate-sodium bicarbonate leach solution. Graphs, tables. 14 ref. (B14, U)

32-B. (French.) **Tests on the Resistance of Refractory Products to Corrosion by Steel and Slag.** J. Massieye and L. Lecrivain. *Bulletin de la société francaise de ceramique,* 1955, no. 28, July-Sept., p. 13-19, 22; disc., p. 20-21.

Apparatus developed to reproduce, on a laboratory scale, actual conditions for corrosion and erosion of refractories. Diagram, photographs. 9 ref. (B19)

33-B. The Pelletizing Plant at Malmbreget, Sweden. *Mining Journal, v.* 245, Dec. 16, 1955, p. 708-709.

Description of full-scale pilot plant with a capacity of approximately 20 tons of magnetite concentrates an hour. Diagrams. (B16, Fe)

34-B. Sintering Plant for Sheffield Steel. *Steel,* v. 138, Jan. 16, 1956, p. 76, 79.

Layout of a plant and ore bedding

system in which the savings in coke alone should pay sintering costs. Diagram, photographs. (B16, AY)

35-B. (English.) **On the Sedimentation of Red Muds in the Bayer Process.** E. Papp, I. Magyarosy and A. Héjja. *Acta Technica Academiae Scientiarum Hungaricae,* v. 13, nos. 1-2, 1955, p. 33-52.

Electrophoretic and other studies of methods to accelerate the settling-out of the insoluble residue of the treatment of bauxite with caustic soda solution. Tables, diagrams, micrographs, graphs, photograph. 17 ref. (B14, Al)

36-B. (French.) **Dolomite Bricks in the Steel Industry.** Marcel Guédras. *Métallurgie et la construction mécanique,* v. 87, no. 11, Nov. 1955, p. 871-873.

Process of manufacturing bricks from dolomite and serpentine by fusion and application of high pressure. (B19)

37-B. (French.) **Comparative Study of Some Properties Relative to Slags and Ashes.** Albert Nicol and Marthe Domine-Berges. *Silicates industriels,* v. 20, no. 11, Nov. 1955, p. 410-418.

Action of water, electrolysis, action of pressure and temperature on slag powder. Tables, graphs, diagrams. 3 ref. (B21)

38-B. (Finnish.) **Otanmäki Vanadium Plant.** Martti Merenmies. *Teknillisen kemian aikakausilehti,* v. 12, no. 19, Nov. 30, 1955, p. 648-650.

New method for vanadium separation of magnetite and ilmenite concentrates. Photographs. (B14, Fe, Ti, V)

39-B. (French.) **Characterization of Tars for Dolomite Linings. Role of Phenols, Naphtalenes, and Insolubles.** J. Massinon. *Centre de documentation sidérurgique, circulaire d'informations techniques,* v. 12, no. 11, 1955, p. 2063-2069.

Using synthetic tars, with varying amounts of phenols, naphthalenes and insolubles, an attempt is made to determine their influence on the cohesion of dolomite refractories. Tables, graphs. (B19, ST)

40-B. (Japanese.) **Studies on the Utilization of Pyrrhotite Ores. I. On the Leaching Process.** Katsuyuki Hikami, Renpei Sei, Fumio Isomura, Katsuji Higuchi, Michio Ichijo, Hiroto Yonezawa, Tatsugoro Iwata and Tadashi Fujinuki. *Resources Research Institute, Report (Japan),* 1955, no. 32, Dec., 32 p.

Research on the wet treatment of pyrrhotite ores. Describes operation of a pilot plant having a 1.5 ton per month capacity. Graphs, tables, diagrams, photographs. (B14, Fe)

41-B. **Surface Tensions of Silicates.** R. E. Boni and G. Derge. *Journal of Metals,* v. 8; *American Institute of Mining Engineers, Transactions,* v. 206, Jan. 1956, p. 53-59.

Review literature dealing with surface tension of molten silicates with compositions of metallurgical interest. Discusses liquid surface tension, methods of measurement, slag constitution, relations to operating problems. Tables, graph. 41 ref. (B21, P10)

42-B. **Adsorption of Ethyl Xanthate on Pyrite.** A. M. Gaudin, P. L. de Bruyn and Olav Mellgren. *Mining Engineering,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 205, Jan. 1956, p. 65-70.

Radio-analysis used to determine effect of pyrite preparation, pH, and oxygen, hydroxyl, hydrosulfide, sulfide and cyanide ions on xanthate adsorption. Graphs, tables. 22 ref. (B14, Fe)

43-B. (Russian.) **Methods of Determining Viscosity of Blast Furnace Slags and Rocks.** D. A. Cherkov. *Zavodskaia laboratoriia,* v. 21, no. 12, 1955, p. 1461-1463.

Description of muffle furnace, thermocouples and other equipment. Experimental methods. Table. 1 ref. (B21, D1)

44-B. (Russian.) **Use of Electron Microscope for the Study of Porous Refractory Materials.** V. V. Pustovalov. *Zavodskaia laboratoriia,* v. 21, no. 12, 1955, p. 1483-1485.

Clay and alumina refractories were studied after polishing. Shape and size of pores determine slag and gas-resistance. Diagrams, micrographs. (B19)

45-B. (Russian.) **Study of Process of Oxidation of Sulfides and Sulfide Ores.** M. E. Pozin, A. M. Ginstling and V. V. Pechkovskii. *Zhurnal prikladnoi khimii,* v. 28, no. 12, Dec. 1955, p. 1249-1254.

Oxidation of sulfides of zinc, iron and cadmium in air streams at various temperatures. Relations between intensity of oxidation, temperature and compositions. Graphs, tables. 12 ref. (B14, Zn, Fe, Cd)

46-B. (Slovak.) **Production of Ferrochromium and Its Importance.** Juraj Holan. *Hutnik,* v. 5, no. 8, Aug. 1955, p. 237-241.

Description and analysis of various types according to the All-Union State Standards (GOST) and power consumption. State of production in

the Soviet Union, Czechoslovakia and the West. Tables, diagrams. 7 ref. (B22, D general, A4, Fe-n)

47-B. A Study of Contact Times in Pilot Plant Agitators, Using Radioactive Tracers. J. C. Turgeon. *Canadian Mining and Metallurgical Bulletin,* v. 49, no. 525, Jan. 1956, p. 16-20; *Canadian Institute of Mining and Metallurgy, Transactions,* v. 59, 1956, p. 16-18.

Study of the flow process in leaching tanks aimed at increasing efficiency of leaching process. Europium 152-154 was used as the tracer. Photograph, diagram, graphs, tables. (B14, S19, U)

48-B. (German.) **Filter Process for Deoxidation of Oxygenated Molten Copper.** F. Erdmann-Jesnitzer and W. Wichmann. *Metall,* v. 10, nos. 1-2, Jan. 1956, p. 2-8.

Use of magnesite sieves and charcoal lump for the production of high-ductility copper. Graphs, diagram, micrographs, photographs. 15 ref. (B22, B14, Cu)

49-B. (Italian.) **Considerations on the Behavior of Refractory Materials Against Thermal Stresses.** L. Massimilla and S. Bracale. *Metallurgia Italiana,* v. 47, no. 11, Nov. 1955, p. 511-518.

Influence of modulus of elasticity, thermal diffusivity, thermal expansion and mechanical strength, and a "homogeneity" factor. (B19)

50-B. (Russian.) **Methods of Improving Cupola Coke.** L. S. Dreizin. *Liteinoe proizvodstvo,* 1955, no. 12, Dec., p. 6-9.

Ash content, density, porosity and composition of coke, coking rate, coarseness of pulverized anthracite, final temperature, other conditions. Tables. (B22)

51-B. Fluidized Roasting of Pyrite. R. B. Thompson and B. H. McLeod. *American Institute of Mining Metallurgical and Petroleum Engineers, Preprint,* 1956, Feb, 17 p.

Practical aspects and microscopic studies. Application of technique to oxidation of pyrite for the production of sulfur dioxide gas. Diagrams, tables. (B15)

52-B. The Gyratory Ball Mill. A. W. Fahrenwald. *American Institute of Mining Metallurgical and Petroleum Engineers, Preprint,* 1956. Feb., 9 p.

Description of mill, its operation, applications. Tables, diagram. (B13)

53-B. Improved Contact Angle Apparatus for Flotation Research. Donald W. McGlashan and Kenneth N. McLeod. *American Institute of Mining Metallurgical and Petroleum Engineers, Preprint,* 1956, Feb., 14 p.

Contact angle apparatus using free bubbles with precise temperature control and continuous pH measurement and recording. Photographs, diagrams, graphs, table. 12 ref. (B14)

54-B. Interpretation of Ore Test Data. D. E. Newton and H. J. Gisler. *American Institute of Mining Metallurgical and Petroleum Engineers, Preprint,* 1956, Feb., 11 p. + 4 plates.

Three examples of interpretation of laboratory concentration and other tests. Diagrams, tables. (B14, Cu)

55-B. A Micrographic Study of Sulphide Roasting. P. G. Thornhill and L. M. Pidgeon. *American Institute of Mining Metallurgical and Petroleum Engineers, Preprint,* 1956, Feb., 17 p.

Particles were separately isothermally roasted in an air-swept system. Progress was followed by examination in polished section and by X-ray and chemical analysis of residual sulfide kernels. Tables. 15 ref. (B15, Fe, Cu)

56-B. Reagent Control in Flotation. C. H. G. Bushell and M. Malnarich. *American Institute of Mining Metallurgical and Petroleum Engineers, Preprint,* 1956, Feb., 12 p. + 5 plates.

Method for analyzing flotation solutions for xanthate. Tests show high correlation between separation efficiency and pH and xanthate concentration. Possibility of automatically controlling reagent additions Graphs. (B14, S11, Fe, Pb, Zn)

57-B. Tuning a Humphreys Spiral Concentrator Plant For Efficient Operation. Henry D. Snedden. *American Institute of Mining Metallurgical and Petroleum Engineers, Preprint,* 1956, Feb., 4 p.

Outline of a plant tune-up program. Description of spiral installation and its loading, adjustment and operation. Tables, diagrams, graphs. (B14)

58-B. The Mechanism of Bursting Expansion in Chrome-Magnesite Bricks. G. R. Rigby. *British Ceramic Society, Transactions,* v. 55, Jan. 1956, p. 22-24; disc., p. 34-35.

The mechanism of bursting expansion that occurs when refractory materials containing chromium ore absorb iron oxide is considered to have its origin in unequal diffusion that occurs in the solid state. Laboratory experiments have shown that when one face of a pellet of magnetite is held against the face of a magnesiochromite pellet at 1350° C., unequal diffusion takes place, iron ions from the magnetite diffusing

more rapidly into the magnesiochromite than chromium ions from the magnesiochromite into the magnetite. Graphs, photograph, table. 20 ref. (B19, N1, Fe)

59-B. Development of the Port Radium Leaching Process for Recovery of Uranium. *Canada, Department of Mines and Technical Surveys, Mines Branch Technical Paper No.* 13, 1955, 22 p.

Process is based on extraction of uranium by treatment of the ore with weak unheated sulphuric acid solutions in the presence of an oxidizing agent. Diagram, tables, graph. (B14, U)

60-B. The Flotation of Radioactive Minerals. T. V. Lord and D. E. Light. *Canadian Mining and Metallurgical Bulletin,* v. 49, no. 526, Feb. 1956, p. 91-95.

Minerals containing uranium have been successfully preconcentrated by flotation. Uraninite, uranothorite, euxenite and fergusonite have responded to flotation to yield grades of 0.2 to 6.0% uranium oxide with recoveries of 85 to 98% from heads analyzing approximately 0.10% uranium oxide. Tables. 4 ref. (B14, U)

61-B. The Place of the Rod Mill in the Grinding Circuit. B. G. MacDermid. *Canadian Mining and Metallurgical Bulletin,* v. 49, no. 526, Feb. 1956, p. 96-105.

Opinions on the field of size reduction which should be allotted to rod mills in the design of crushing and grinding circuits. Tables, diagram. 12 ref. (B13)

62-B. Technical Advances During 1955. II. Milling and Process Metallurgy. L. E. Djingheuzian. *Canadian Mining Journal,* v. 77, Feb. 1956, p. 119-122.

The cumulative effect of some of the most important milling and process metallurgy developments and events in 1955. Photographs, table. 5 ref. (B13, B14)

63-B. New Moves on the Lithium Chessboard. *Chemical Week,* v. 78, Feb. 11, 1956, p. 60, 62.

A chlorine volatilization process for recovery of lithium from pegmatite ore. Diagram. (B14, Li)

64-B. Ore Dressing. James W. Franklin. *Engineering and Mining Journal,* v. 157, Feb. 1956, p. 133-136.

1955 was highlighted by developments in uranium, the success of synthetic flocculants, a throw-away table deck, a successful year for one autogenous grinding unit, and a great amount of new mill construction and planning. Lists new mills and patents. Photographs, tables. (B13, B14, U, Al)

65-B. Iron Ore Beneficiation. Fred D. DeVaney. *Engineering and Mining Journal,* v. 157, Feb. 1956, p. 141-143.

Survey of 1955 developments. Photographs. (B14, Fe)

66-B. Kinetic Study of the Oxidation of Sphalerite. John N. Ong, Jr., Milton E. Wadsworth and W. Martin Fassell, Jr. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Feb, 1956, p. 257-263.

Temperature and oxygen concentration dependence on the reaction of sphalerite in oxygen at pressures from 6 to 640 mm. mercury was investigated in the range 700-870° C. Conditions for a sulfatizing or oxidizing roast proposed. Graphs, tables, diagrams. 20 ref. (B15, Zn)

67-B. Geology in Mining. J. D. Forrester. *Mining Congress Journal,* v. 42, Feb. 1956, p. 100-104, 112.

Basic geologic methods with trends to diversification, application of specialized techniques, continuation of uranium search characterize a year of commendable progress by mining geologists. Photographs. (B12, U)

68-B. Mineral Dressing in 1955. T. M. Morris. *Mining Congress Journal,* v. 42, Feb. 1956, p. 113-115.

Intensified research in beneficiation techniques was the most important development in ore concentration. Photographs. (B14)

69-B. Flotation. Nathaniel Arbiter. *Industrial and Engineering Chemistry,* v. 48, Mar. 1956, pt. 2, p. 527-531.

Theory and surface chemistry of flotation, its application in the separation of solids, description of plant operations. Photographs. 148 ref. (B14)

70-B. Size Reduction. Lincoln T. Work. *Industrial and Engineering Chemistry,* v. 48, Mar. 1956, pt. 2, p. 556-559.

Various aspects of particle size reduction and control size measurement, grinding, classification, applications. Photographs. 107 ref. (B13)

71-B. The Choice and Construction of Monolithic Linings for Twin Bath Induction Furnaces for Melting Aluminum Alloys. II. E. J. Thackwell. *Industrial Heating,* v. 23, Feb. 1956, p. 372, 374, 376-377.

Effect of furnace design on method of ramming and preparation of ramming material. (To be continued. (B19, E10, Al)

72-B. Recent Developments—Sintering and Pelletizing. Edwin N. Hower and John A. Anthes. *Iron and Steel Engineer,* v. 33, Feb. 1956, p. 60-65; disc., p. 65-67.

Recent demands for upgrading ores and for obtaining more production from blast furnaces are being met through increased use of sinter and pellets. Diagrams, photographs, graph, table. (B16)

73-B. Beneficiation in 1955. Will Mitchell, Jr. *Mining Engineering,* v. 8, Feb. 1956, p. 184-194.

Developments in comminution, separation and concentration. Photographs, diagram. (B14, Fe)

74-B. Depolarizing Magnetite Pulps. M. F. Williams and L. G. Hendrickson. *Mining Engineering,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 205, Feb. 1956, p. 201-209.

Apparatus and procedures for reducing or eliminating residual magnetism in heavy-medium separation of ferromagnetic materials such as magnetite or ferrosilicon. Diagrams, tables, graphs. 11 ref. (B14, Fe)

75-B. Preliminary Investigation of Carbonate Leaching. Edmund G. Brown. *American Cyanamid Company, Raw Materials Development Laboratory (U. S. Atomic Energy Commission),* ACCO-36, Oct. 1953, 32 p.

The procedure giving best extraction of uranium involved leaching at 95° C. for 24 hr. with 10% sodium carbonate solution containing 5% sodium bicarbonate and 35 lb. per ton of potassium permanganate; extraction of 89.9% of the uranium was effected by this procedure. Tables. 3 ref. (B14, U)

76-B. Concentration of Low Grade Ores at the Humboldt Mine. Richard R. Smith. *Blast Furnace and Steel Plant,* v. 44, Mar. 1956, p. 309-314.

Description of mine and plant, flotation process, initial plant startup, operation. Photographs, tables. 7 ref. (B14, Fe)

77-B. The Choice and Construction of Monolithic Linings for Twin Bath Induction Furnaces for Melting Aluminum Alloys. III. E. J. Thackwell. *Industrial Heating,* v. 23, Mar. 1956, p. 598 + 6 p.

Ramming method and step-by-step formation of the lining for the aluminum melting furnace. Diagram, photographs. (To be continued.) (B19, E10, Al)

78-B. (French.) **Thermal Characteristics of Insulating Refractory Products.** L. Halm and P. Lapoujade. *Bulletin de la société francaise de ceramique,* 1955, no. 29, Oct.-Dec. 1955, p. 3-19.

Effect of porosity, and size and shape of pores on variation of the coefficient of thermal properties. Description of apparatus for determining thermal properties. Tables, graphs, photograph, diagrams. 22 ref. (B19, P11)

79-B. (French.) **Study of Heat Shock Resistance of Certain Sintered Refractories.** M. S. Tacvorian. *Bulletin de la societe francaise de ceramique,* 1955, no. 29, Oct.-Dec. 1955, p. 20-40.

Correlation of cross-breaking strength with heat shock resistance. Studies of bodies containing alumina and chromium and other refractory combinations. Tables, graphs, photographs, diagram. 12 ref. (B19)

80-B. (Italian.) **Principal Corrective Elements of Cast Iron and Steel. Their Influence and Use.** *Fonderia,* v. 5, no. 1, Jan. 1956, p. 49, 51, 53, 55.

Influence and use of calcium, boron, carbon, cobalt and chromium as corrective elements. (To be continued.) (B22, CI)

81-B. (Polish.) **Problems Relating to the Beneficiation of Polish Iron Ores.** Tadeusz Szreter. *Hutnik,* v. 22, no. 10, Oct. 1955, p. 350-358.

Review of iron ore beneficiation methods. Postwar research in Poland and Germany on the possibility of concentrating certain Polish ores. Analysis and porosity of Czech, Slovak, Swedish and Polish siderites. Other foreign and native ores compared. Tables. 44 ref. (B14, Fe)

82-B. (Polish.) **Cooling of Iron-Ore Agglomerates.** Tadeusz Sloniowski. *Hutnik,* v. 22, no. 10, Oct. 1955, p. 369-371.

Cooling by air, water or by both before charging blast furnace. Effect of agglomerate properties on cooling process. Diagram. 7 ref. (B16, D1, Fe)

83-B. Cyclones in Closed-Circuit Grinding. Richard W. Krebs. *American Institute of Mining Metallurgical and Petroleum Engineers, Preprint,* 1956, Feb. 1956, 18 p.

Operational data on several diversified applications of the cyclone classifier in the mining industry. Some features of design and control. Graph, tables. (B13)

84-B. Economic Determination of a Mining and Milling Project for A.I.M.E. James Boyd. *American Institute of Mining Metallurgical and Petroleum Engineers, Preprint,* 1956, Feb., 7 p.

Some of the many complicated technical and economic factors which a prospective investor in a mining and milling project must evaluate. (B12, B13)

85-B. Flotation Studies With Alkyl Chelate Type Collectors. I. A. Patel, K. U. Patel, M. F. Obrecht and C. C. DeWitt. *American Institute of Mining Metallurgical and Petroleum Engineers, Preprint,* 1956, Feb. 1956, 7 p.

Data on the flotation separation of cassiterite, rutile, ilmenite, calamine and willemite, and iron oxide from taconite. Gaphs, tables. 43 ref. (B14)

86-B. Flowsheets—Types and Uses. O. W. Walvoord. *American Institute of Mining Mettallurgical and Petroleum Engineers, Preprint,* 1956, Feb., 15 p.

Flowsheet types and their relative advantages. Diagrams, tables. (B14, B13)

87-B. Formal Discussion on Jigs. A. P. Massmann. *American Institute of Mining Metallurgical and Petroleum Engineers, Preprint,* 1956, Feb., 7 p.

Factors involved in good performance of jig. (B14)

88-B. The Impact of New Flocculants on Hydrometallurgical Processes. R. S. Olson. *American Institute of Mining Metallurgical and Petroleum Engineers, Preprint,* 1956, Feb. 1956, 15 p.

Properties of new flocculants and changes which they may bring about in hydrometallurgical operations. Graphs, photographs. (B14)

89-B. A Kinetic Study of the Leaching of Molybdenite. William H. Dresher, Milton E. Wadsworth and W. Martin Fassell, Jr. *American Institute of Mining Metallurgical and Petroleum Engineers, Preprint,* 1956, Feb. 1956, 30 p.

Dissolution rate of molybdenite in alkaline solution; effects of temperature, oxygen over-pressure and potassium hydroxide concentration. Graphs, tables 16 ref. (B14, Mo)

90-B. Laboratory Recovery of an Oxidized Lead Mineral From a Southeast Missouri Deposit. M. M. Fine and E. J. Haug. *American Institute of Mining Metallurgical and Petroleum Engineers, Preprint,* 1955, Apr. 1956, p. 390-392.

A more complete recovery of the cerussite was effected by flotation with a tall oil than by gravity concentration or conventional sulhpidization flotation. Tables. 2 ref. (B14, Pb)

91-B. Modernization of Bunker Hill Pre-Sintering Practices. Harold E. Lee and Donald Ingvoldstad. *American Institute of Mining Metallurgical and Petroleum Engineers, Preprint,* 1956, Feb. 1956, 15 p.

Background of original plant, design and operation of new crushing charge storage and proportioning, bedding and pelletizing plants. Tables, diagrams. (B13, B16, Zn)

92-B. Preconcentration of Primary Uranium Ores by Flotation. Burt C. Mariacher. *American Institute of Mining Metallurgical and Petroleum Engineers, Preprint,* 1956, Feb., 8 p.

A flotation process was developed from an investigation to determine the amenability of primary uranium ores to preconcentration by methods based on the physical properties of the ore. Tables, diagram. (B14, U)

93-B. Principles and New Developments in Uranium Leaching. A. M. Gaudin. *American Institute of Mining, Metallurgical and Petroleum Engineers, Preprint,* 1955, Aug. 1955, 18 p.

New ideas that have changed the technology of uranium leaching since the war, including continuous leaching, use of noncorrosive liquors, use of ambient, temperature, and new processes for extraction. Tables. (B14, U)

94-B. Production of Granules (Pelletizing) From Dusts and Small-Particle-Size Materials. H. F. Reich. *Henry Brutcher Translation No.* 3638, 13 p. (From *Chemie-Ingenieur-Technik,* v. 25, no. 8/9, 1953, p. 437-441). Henry Brutcher, Altadena, Calif.

Granules produced by the avalanche and surface-tension processes, with special reference to the Eirich mixer. Principles and underlying physics. Table, graph, diagrams, photograph. 2 ref. (B16)

95-B. (Dutch.) X-Ray Diffraction Analysis of Magnesite Floors. P. M. De Wolff. *T.N.O.-Niews,* v. 11, no. 119, Feb. 1956, p. 49-54.

Identification of phases in a large number of experimental and used floors; study of crystal structure in these phases. Photograph, electron micrograph, diagram. 2 ref. (B19, D2)

96-B. (French.) Demagnetization, by Action of Alternating Magnetic Fields, of Magnetite and Alpha-Iron Sesquioxide. Francine Rimbert. *Comptes rendus,* v. 242, no. 7, Feb. 7, 1956, p. 890-893.

Essential facts relative to isothermal residual magnetization (ARI) and to thermo residual magnetiza-

tion (ATR). Tables, graph. 3 ref. (B14, P16, Fe)

97-B. (German.) **Possibilities of Errors in the Estimation of Particle Size Distributions.** W. Batel. *Chemie-Ingenieur-Technik,* v. 28, no. 2, Feb. 1956, p. 81-87.

Attempts to state the main sources of error in sampling and means of avoiding them. Tables, graphs, diagrams. 36 ref. (B11)

98-B. (German.) **Mechanical Methods of Ore Treatment.** H. Trawinski. *Chemie-Ingenieur-Technik,* v. 28, no. 2, Feb. 1956, p. 97-106.

Flotation, and pre and after treatments pertaining to flotation. Graphs, diagrams. 49 ref. (B13, B14)

99-B. (German.) **New Ways for Assessing the Coke Strength by Screening Classification and Tumbler Test.** Friedrich Wesemann, Ulrich Graf and Rolf Wartmann. *Stahl und Eisen,* v. 76, no. 3, Feb. 9, 1956, p. 133-144.

Fundamentals for the development of a new quality index and its graphic representation. Consistency, accuracy of individual determinations, influence of transportation and of tumbling time. Validity and sensitiveness of the new index number. Comparison with the results of other testing methods. Graphs, micrographs, tables. 13 ref. (B18, B22)

100-B. (German.) **Mechanization of the Process of Testing the Strength of Blast Furnace Coke and Test Results Obtained in an Integrated Steelworks.** Wilhelm Wolf. *Stahl und Eisen,* v. 76, no. 3, Feb. 9, 1956, p. 145-150; disc. p. 150-152.

Development testing methods, mechanization of the screening process, description of the screening machine and its method of operation. Results obtained. Diagrams, graphs, photographs. 2 ref. (B22, D1)

101-B. (Book.) **Refractories. Their Manufacture, Properties and Uses.** Manohar L. Misra. 151 p. 1954. Benares Hindu University, Benares. $2.10.

General information on refractories and refractory requirements of Indian industry. (B19)

102-B. Refractories. V. O. P. Nicholson. *Metal Industry,* v. 88, Mar. 30, 1956, p. 245-248.

Phase relationships studied. Table, phase diagrams. 9 ref. (B19)

103-B. Design and Evaluation—Turbine Mixers in Metallurgical Applications. N. H. Parker, G. Gutzeit and J. G. Papailias. *Mining Engineering,* v. 8, Mar. 1956, p. 288-292.

Various applications in extractive metallurgy. Diagrams, graphs, table. (B14, C general)

104-B. Flotation and Leaching of Products From High Lime Utex Ores. D. R. George and Robert A. Eisenhauer. *National Lead Co., Inc., Raw Materials Development Laboratory (U. S. Atomic Energy Commission),* WIN-2, Dec. 1954, 45 p.

Test data on the flotation of calcite from high lime Utex ores and on leaching of the products with sulfuric acid or sodium carbonate solutions. Tables. (B14, U)

105-B. Initial Operation of New Acid Leach Resin-in-Pulp Pilot Plant. C. K. McArthur, T. F. Izzo and R. L. Shimmin. *National Lead Company, Inc., Raw Materials Development Laboratory (U. S. Atomic Energy Commission),* WIN-17, July 1955, 28 p.

Fourteen-bank system proved practical in operation and highly efficient for uranium recovery from desanded ore pulps. Tables, diagrams. (B14, U)

106-B. Preparation of Pure Zirconium Oxide; Laboratory Studies. W. R. Grimes, C. J. Barton, Sr., L. G. Overholser, J. P. Blakely and J. D. Redman. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission),* Y-560, Feb. 1950, 64 p.

Recent improvements in the thiocyanate process for hafnium extraction; methods for purification of hafnium-free zirconium. Tables. 8 ref. (B14, Zr)

107-B. Hafnium Metal. I. Conversion of Hafnium Oxide to Hafnium Tetrafluoride. Joe L. Williams and Boyd Weaver. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission),* Y-644, Aug. 1950, 11 p.

Anhydrous hafnium tetrafluoride, free from significant amounts of oxygen and other impurities, was prepared by hydrofluorination of ignited hafnium oxide, followed by vacuum sublimation. Table, photograph, diagrams. 7 ref. (B14, Hf)

108-B. (English.) **Theoretical Studies on Magnetic Separation. I. Magnetic Forces of Mineral Particles and the Sensitivity of Magnetic Separation.** Saburo Yashima. *Technology Reports, Tohoku University,* v. 20, no. 1, 1955, p. 143-164.

The fundamental equation of magnetic force affecting a mineral particle under given field conditions; application to particles of uniform composition and to rocked particles. Diagrams, graphs, tables. 11 ref. (B14)

109-B. The Roasting of Pitchblende Ore. O. J. Buckheim, H. C. Kloep-

per, R. M. Paine, A. E. Ruehle, J. W. Stevenson and L. G. Weber. *U. S. Atomic Energy Commission Research and Development Report,* NYO-1315, Dec. 1950, 11 p.

Effect of air and steam roasting on the sulfur content, uranium recovery, acid consumption and filtration rate of several ores, including those of both high and low initial sulfur content. Tables, graphs. (B15, U)

110-B. Physical Chemistry of the Krupp-Renn Process. H. Weidermann. *Henry Brutcher Translation No.* 3486, 21 p. (From *Metallurgie und Giessereitechnik,* v. 4, no. 11, 1954, p. 462-468.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 38-B, 1955. (B16, Fe)

111-B. New Process of Pouring Ferrosilicons. Ya. V. Dashevskii, A. E. Runov, I. S. Kazak, D. D. Zheltov and B. A. Mel'nik. *Henry Brutcher Translation No.* 3636, 16 p. (From *Stal,* v. 15, no. 8, 1955, p. 714-719.) Henry Brutcher, Altadena, Calif.

A new generally adaptable method of producing clean and stable 45 and 75% ferrosilicon slabs which eliminates dressing of the ingots. Tables, graphs, diagrams. 10 ref. (B22, D9, Fe, Si)

112-B. (English.) **Studies on the Separation of the Rare Earths and Their Accompanying Elements. X. A New Quantitative Precipitation of Thorium and Rare Earths From a Homogeneous Solution, and Its Application for the Extraction of Some Elements From Ores. XI. Absorption Spectra of Light Lanthanons and Thorium in Ultraviolet and Visible Range From the Viewpoints of Their Determinations.** Zenzi Hagiwara. *Technology Reports, Tohoku University,* v. 20, no. 1, 1955, p. 77-108.

A proposed scheme of extraction of rare earths and thorium from a monazite sand. Absorption spectra measured as a guide to the efficiency of separation. Tables, graphs, photograph, diagram. 25 ref. (B14, S11, EG-g, La, Th)

113-B. (English.) **The Phase $CaO{\cdot}Fe_2O_3$ in the System CaO-Fe_2O_3, and Its Importance as Binder in Ore Pellets.** John Olof Eström. *Jernkontorets Annaler,* v. 140, no. 2, 1956, p. 101-113.

The phase diagram was revised in its ferric oxide-rich portions. The above phase is stable at temperatures used in pellet production. Addition of calcium oxide raises crushing strength of pellets. Graphs, diagram, tables, micrographs. (B16, M24, Fe)

114-B. (Russian.) **The Chemical Theory of Slag Structure. V. A. Kozheurov.** *Zhurnal Fizicheskoi Khimii,* v. 30, no. 2, Feb. 1956, p. 295-304.

Comparison of results of calculating the activities of binary and ternary solutions according to the chemical theory of melts to the theory of regular solutions (zero approximation), and to formulas obtained on consideration of short range order (first approximation). Graphs, tables. 10 ref. (B21)

115-B. The Eldorado Gravity Plant, Port Radium, N. W. T. R. L. Behan. *Canadian Mining & Metallurgical Bulletin,* v. 49, No. 528, Apr. 1956, p. 254-261.

Developments of methods of treatment of uranium ores. Details of present flow-sheet and a tailings reclamation program now being carried out. Diagrams, photographs. 3 ref. (B14, U)

116-B. Leaching of Uranium From Gravity Miill Tailings At Port Radium, N. W. T. D. F. Lillie and R. Tremblay. *Canadian Mining & Metallurgical Bulletin,* v. 49, no. 528, Apr. 1956, p. 262-273.

Chemical processes employed in recovering uranium remaining in gravity plant tailings. Plant is designed to handle 300 tons per day. Diagram, photographs, tables. 3 ref. (B14, U)

117-B. Solid Fuels and the Dwight-Lloyd Sintering Process. Harold E. Rowen. *Mining Engineering,* v. 8, Apr. 1956, p. 396-398.

Sintering mechanisms explained on the basis of combustion of solid fuel with 90 to 95% ash content. Diagrams, photographs. (B16)

118-B. Influence of Temperature on Mechanical Strength of Coke. John Varga, Jr., and H. W. Lownie, Jr. *American Foundrymen's Society, Preprint No.* 56-27, 1956, 4 p.

Investigation of bulk samples of coke, as used in the cupola, rather than individual pieces. Mechanical strength of coke at room temperature gives no indication of its mechanical strength at the higher temperatures encountered in cupola operation. Diagram, graphs, photographs. 10 ref. (B22, E10)

119-B. Sintering Practice at Ford Motor Company. Robert L. Cleveland. *Blast Furnace, Coke Oven and Raw Materials Committee of the Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, Proceedings,* v. 14, 1955, p. 15-23; disc., p. 23-26.

Report on present sintering facili-

ties, with special emphasis on the utilization of concentrates of high iron content produced from low-grade hematite deposits. Tables, diagram, photographs. (B16, A5, Fe)

120-B. Permeability of Sinter-Plant Feed. M. O. Holowaty and John F. Elliott. *Blast Furnace, Coke Oven and Raw Materials Committee of the Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, Proceedings,* v. 14, 1955, p. 26-38; disc., p. 38-42.

A laboratory study of the influence of ore mixtures, method of mixing, moisture content and percentage of return fines on the permeability of several types of raw feed. Graphs, photographs, diagram, tables. 5 ref. (B16, Fe)

121-B. Study of the Productivity of Conventional Dwight-Lloyd Sintering Machine. M. O. Holowaty, H. A. Goldfein and C. B. Sheets. *Blast Furnace, Coke Oven and Raw Materials Committee for the Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, Proceedings,* v. 14, 1955, p. 43-75; disc., p. 75-81.

Production rate of sinter can be increased substantially by making proper changes in the equipment and the operational practices used at the conventional installation. Diagram, graphs, photographs, tables. 22 ref. (B16, Fe)

122-B. Production and Properties of Experimental Pellet-Sinter. F. M. Hamilton and H. F. Ameen. *Blast Furnace, Coke Oven and Raw Materials Committee of the Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, Proceedings,* v. 14, 1955, p. 82-89; disc., p. 89-92.

The crux of the process lies in the preparation of a green pellet of the proper size and containing the proper amounts of fuel and moisture. Micrographs, graphs, tables, photographs. 2 ref. (B16, Fe)

123-B. The Making of Self-Fluxing Sinter and Its Use in the Blast Furnace. *Blast Furnace, Coke Oven and Raw Materials Committee of the Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, Proceedings,* v. 14, 1955, p. 134-149; disc., p. 149-154.

Sinter quality, plant productivity, process control, factors affecting coke consumption, gas distribution over furnace cross-section and blast furnace productivity. Photographs, tables, diagrams, graphs. 20 ref. (B16, D1, Fe)

124-B. Lyometallurgical Tests on Marysvale Uranium Ores. F. W. Bloecher, Jr. *Massachusetts Institute of Technology Mineral Engineering Laboratory (U. S. Atomic Energy Commission),* MITG-252, Nov. 1950, 28 p.

Uranium extractions range from 80 to 92% either by leaching raw ore with 10% nitrated ethyl ether or by leaching sulfuric acid-digested material with 5% nitrated ethyl ether. Graphs, tables. 8 ref. (B14, U)

125-B. Recovery of Uranium From Its Ores. G. Marvin, T. Upchurch, E. Greenleaf, E. Van Blarcom and A. Morphew. Paper from "Proceedings of the International Conference on the Peaceful Uses of Atomic Energy. v. VIII. Production Technology of the Materials Used for Nuclear Energy". United Nations. p. 3-7.

Summary of recovery processes. Graphs. (B14, C general, U)

126-B. Principles and New Developments in Uranium Leaching. A. M. Gaudin. Paper from "Proceedings of the International Conference on the Peaceful Uses of Atomic Energy. v. VIII. Production Technology of the Materials Used for Nuclear Energy". United Nations. p. 8-12.

Significant features of developments in uranium leaching in the post-war decade. Tables. (B14, U)

127-B. Some Unusual Problems Met in the Recovery of Uranium From a Very Low-Grade Ore. M. D. Hassialis and R. C. Musa. Paper from "Proceedings of the International Conference on the Peaceful Uses of Atomic Energy. v. VIII. Production Technology of the Materials Used for Nuclear Energy". United Nations, p. 13-17.

Most critical factors are entrainment and solubility losses. Graphs, tables. 8 ref. (B14, U)

128-B. Alkaline Leaching of Uranium Ores. F. M. Stephens, Jr., and R. D. MacDonald. Paper from "Proceedings of the International Conference on the Peaceful Uses of Atomic Energy. v. VIII. Production Technology of the Materials Used for Nuclear Energy". United Nations. p. 18-25.

Chemistry of carbonate leaching, factors affecting reaction rates, flowsheets. Diagrams, graph. 9 ref. (B14, U)

129-B. The Carbonate Chemistry of Uranium: Theory and Applications. L. A. McClaine, E. P. Bullwinkel and J. C. Huggins. Paper from "Proceedings of the International Conference on the Peaceful Uses of Atomic Energy. v. VIII. Production Technology of the Materials Used for Nu-

clear Energy". United Nations. p. 26-37.

Review of theory. Carbonate leaching of ores, recovery of uranium from carbonate leach solution. Tables, graphs. 44 ref. (B14, U)

130-B. Accelerated Thickening and Filtering of Uranium Leach Pulps. Joe B. Rosenbaum and J. Bruce Clemmer. Paper from "Proceedings of the International Conference on the Peaceful Uses of Atomic Energy. v. VIII. Production Technology of the Materials Used for Nuclear Energy". United Nations. p. 38-44.

Research to find better additives for improving thickening and filtration of uranium leach pulps and other plant products. Tables. 3 ref. (B14, U)

131-B. Canadian Practice in Ore Dressing and Extractive Metallurgy of Uranium. A. Thunaes. Paper from "Proceedings of the International Conference on the Peaceful Uses of Atomic Energy. v. VIII. Production Technology of the Materials Used for Nuclear Energy". United Nations. p. 81-84.

Uranium and associated mineral in the more important ores; effect of these on ore treatment. Leaching and pre-concentration methods. 9 ref. (B14, U)

132-B. Recovery of Uranium From Uranium Bearing Alum Shale. Erik Svenke. Paper from "Proceedings of the International Conference on the Peaceful Uses of Atomic Energy. v. VIII. Production Technology of the Materials Used for Nuclear Energy". United Nations. p. 90-93.

Development of industrial shale treatment methods in Sweden. Photographs, diagrams, graph, table. (B14, U)

133-B. Beneficiation Characteristics of Uraniferous Ores in India. R. Krishnaswamy, J. Y. Somnay and G. V. Rao. Paper from "Proceedings of the International Conference on the Peaceful Uses of Atomic Energy. v. VIII. Production Technology of the Materials Used for Nuclear Energy". United Nations. p. 136-139.

Because of the complexity of uranium minerals occurring in the ores and because of the extreme fineness of grind required for their liberation, direct methods of concentration have been of little use. Photograph, tables, autoradiograph. (B14, U)

134-B. (Russian.) **Pretreatment of Raw Materials for Smelting at the Magnitogorsk Metallurgical Combine.** A. P. Iakobson. *Metallurgy,* no. 1, Jan. 1956, p. 3-6.

Some pretreatment features essential to good smelting: blending of ores prior to concentration; maintenance of the desired chemical composition of the agglomerate mix; thorough crushing of flux, ore and fuel. Tables. (B general)

135-B. (Russian.) **Production of Fluxed Agglomerate at the Makeevka Metallurgic Plant.** B. G. Kumani and M. Sh. Barylo. *Metallurg,* no. 2, Feb. 1956, p. 3-5.

Advantages of adding quicklime to limestone used as flux in sintering agglomerate. Diagram, tables. (B16, Fe)

136-B. Uranium Oxide From Ores. Arthur Linz. *Chemical Engineering Progress,* v. 52, May 1956, p. 205-209.

Six process flowsheets. Tables, map. (B14, U)

137-B. Raw Materials Conference on Solvent Extraction. Arthur M. Ross. *National Lead Company, Inc. Raw Materials Development Laboratory (U. S. Atomic Energy Commission),* TID-7508, Apr. 1955, 72 p.

Seven papers concerning the application of solvent extraction to raw materials processing. Photograph, tables, graphs, diagrams. (B14)

138-B. Preliminary Pilot Plant Testing of Resin-in-Pulp Ion Exchange of Alkaline Leach Pulps. C. K. McArthur, T. F. Izzo, R. G. Beverly, A. W. Griffith and R. L. Shimmin. *National Lead Company Inc., Raw Materials Development Laboratory (U. S. Atomic Energy Commission),* WIN-11, Apr. 1955, 21 p.

Tests to determine the possibility of recovering uranium from alkaline leach pulps; a tentative pilot plant flowsheet. Tables, diagram. (B14, U)

139-B. New Methods of Testing Blast-Furnace Sinter for Its Mechanical Properties. N. Z. Plotkin, G. G. Oreshkin and A. K. Rudkov. *Henry Brutcher Translation No.* 3645, 10 p. (From *Stal,* v. 15, no. 10, 1955, p. 887-891.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 13-B, 1956. (B16, Q general, Fe)

140-B. (German.) **Reactions Between Molten Iron Phosphorus Slag.** Oskar Peter, Wilhelm von dem Esche and Willy Oelsen. *Archiv für das Eisenhüttenwesen,* v. 27, no. 4, Apr. 1956, p. 219-230.

Possibilities of smelting phosphorus slags of different iron content by use of phosphoric acid

dolomite. The slags are saturated with calcium and magnesium oxide crystals. The phosphorus content seems to be independent of the iron content. Tables, graphs, photograph, micrographs, phase diagram. 16 ref. (B21, Fe)

141-B. (Swedish.) **Grinding Investigations at Malmberget.** Bengt Fagerberg and Lennart Wellenius. *Jernkontorets Annaler,* v. 140, no. 3, 1956, p. 189-223.

Data on a Swedish plant for the production of high-grade magnetite concentrates which will be pelletized. Mill feed will consist of 15 mm. magnetite ore and middlings from a dry magnetic separation plant. Tables, graphs, diagram, photograph. 36 ref. (B13, Fe)

142-B. Development of the Inco Iron Ore Recovery Process. *Canadian Mining and Metallurgical Bulletin,* v. 49, no. 529, May 1956, p. 337-343.

Production of ferrous by-product from nickel ores. Pilot plant studies of roasting, leaching, and agglomerating procedures. Tables, diagrams. 17 ref. (B14, B15, B16, Fe)

143-B. Uranium Extractants—Preparation and Use in Phosphate System. H. Heidt, D. E. Tynan, R. F. McCullough and R. Bart. *International Minerals and Chemical Corporation (U. S. Atomic Energy Commission),* RMO-2030, Sept. 1954, 121 pages.

Data on research accomplishments on the preparation of organic phosphate esters for the extraction of uranium from monocalcium phosphate, phosphoric acid and other acidic phosphate solutions using liquid-liquid extraction techniques. Tables, graphs. (B14, U)

144-B. Uranium Recovery—Wet Process Liquors From Phosphate Rock. Henry M. Heidt, Donald E. Tynan, J. B. Adams and Roger Bart. *International Minerals and Chemical Corporation (U. S. Atomic Energy Commission),* RMO-2042, Feb. 1955, 124 p.

Summary of laboratory research and pilot plant development programs on the extraction and recovery of uranium from monocalcium phosphate extract and wet process phosphoric acid. Diagrams, graphs, tables. (B14, U)

145-B. Recovery of Uranium as a Single Product From the Florida Leached Zone. C. F. Coleman. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission),* ORNL-1500, Mar. 1953, 131 p.

A wide variety of ore samples were studied for extraction of uranium and for recovery of uranium from the resulting pregnant liquor. Diagram, graphs, tables. 14 ref. (B14, U)

146-B. (French.) **Notes on Industrial Research in the Field of Ore Reduction. Application to the Production of 75% Ferrosilicon.** A. Palazzi and F. Rinaldi. *Revue de Métallurgie,* v. 53, no. 2, Feb. 1956, p. 92-104.

Research carried out in an electric low-shaft furnace, producing 75% ferrosilicon. Tables, graphs, histograms. 7 ref. (B22, Fe-n)

147-B. (French.) **Sulfur in Silicate and Aluminate Slags.** F. D. Richardson and C. J. B. Fincham. *Revue de Métallurgie,* v. 53, no. 3, Mar. 1956, p. 215-230; disc., p. 231-232.

Study of the partition of sulfur between gases containing sulfur and oxygen under controlled partial pressure, and slags used in iron and steelmaking. Graphs, tables. 31 ref. (B21, D general, Fe, ST)

148-B. (Polish.) **Ionic Theory of Slags.** Andrzej Staronka. *Hutnik,* v. 23, no. 3, Mar. 1956, p. 110-117.

Fundamentals of the problem, method of determination of slag activity on basis of the theory of ideal solutions. Graphs, diagrams. 32 ref. (B21)

149-B. Investigation of Washer Slimes as a Source of Uranium. R. C. Meaders, H. W. Adam, J. W. Cookston, O. F. Tangel and A. C. Richardson. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* BMI-235, June 1950, 29 p.

Treatment with sulphuric acid dissolves the uranium which can be recovered by treating the pulp with an anion-exchange resin. Uranium from this source would be very costly. Graph, tables. (B14, U)

150-B. Recovery of Uranium From North Dakota Lignites. R. A. Ewing, H. W. Adam, F. W. Miles, A. E. Bearse and A. C. Richardson. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* BMI-237, July 1950, 51 p.

Mineralogy of sample studied and mineralogical composition estimated. Results of float-sink tests and chemical analyses. Hydrometallurgical recovery methods investigated briefly. Graph, tables. (B14, U)

151-B. Recovery of Uranium From Phosphate Rock. E. F. Stephan, John Chocholak, Iver Igelsrud and H. A. Pray. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* BMI-238, June 1950, 100 p.

Processes investigated from recovery of uranium from phosphate rock and from superphosphate and phosphoric acid derived from phosphate rock. Leaching and precipitation techniques. Graphs, diagrams, tables. 13 ref. (B14, U)

152-B. A-Ore on the Plateau. *Chemical and Engineering News,* v. 34, June 18, 1956, p. 2968-2973.

Ion exchange and solvent extraction are significant among new developments in the processing of uranium ore. Diagram, photographs. (B14, U)

153-B. Direct Measurement of Ferrous Ion Mobility in Liquid Iron-Silicate by a Radioactive Tracer Technique. M. T. Simned, Ling Yang and G. Derge. *Journal of Metals,* v. 8, May 1956, p. 690-692.

Experiments furnished direct evidence of the electrolytic migration of ions in silica-saturated iron silicate and a measurement of the ionic mobility at 1250° C. Diagram, graphs. 6 ref. (B21, S19, Fe)

154-B. Uranium in Canada. A. H. Lang and H. R. Steacy. *Mining Engineering,* v. 8, June 1956, p. 618-621.

Discovery and development of Canada's principal ore deposits. Photographs. (B10, A4, U)

155-B. Metallurgical Treatment of Uranium Ore. William L. Lennemann. *Mining Engineering,* v. 8, June 1956, p. 622-628.

Uranium recovery processes now being used in western mills. Diagrams, table, photographs. (B14, U)

156-B. Ultransonic Desliming and Upgrading of Ores. S. C. Sun and D. R. Mitchell. *Mining Engineering,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 205, June 1956, p. 639-644.

Proposed method depends primarily upon the stratifying and peptizing action caused when high-frequency sound waves are propagated upward through ore pulp in a cylinder tube. Ultrasonic stratification of mineral particles in water is experimentally verified. Diagram, photograph, graphs, tables. 16 ref. (B14)

157-B. Mineral Dressing. F. B. Michell. *Mining Journal (Annual Review),* 1956, May 1956, p. 123 + 8 pages.

Recent developments in comminution, sizing, gravity concentration, dense media separation and flotation; atomized ferrosilicon, magnetic and electrostatic separation processes; concentration of specific minerals. Photographs, diagrams. 42 ref. (B13, B14)

158-B. Cost of Uranium Recovery by the Amine Extraction Process. B. B. Klima, H. M. McLeod, Jr., A. D. Ryon and R. R. Wiethaup. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission),* ORNL-1949, Sept. 1955, 36 p.

Estimated costs include the processing steps associated with clarification, solvent extraction, uranium precipitation, calcination and packaging of product. Diagrams, tables. (B14, U)

159-B. Theoretical Studies on Magnetic Separation. II. Effects of Demagnetizing Field on the Magnetization of Irregular Formed Mineral Particles. Saburo Yashima and Tadashi Ohyama. *Technology Reports Tohoku University,* v. 20, 1956, p. 197-211.

Average demagnetizing factor of liberated magnetite particles having irregular forms. Fundamental equation of magnetic force affecting a mineral particle under given field conditions. Diagrams, graphs. 4 ref. (B14, Fe)

160-B. (German.) **Development of the Iron Ore Pelletizing Process.** Kurt Meyer. *Stahl und Eisen,* v. 76, no. 10, Mar. 19, 1956, p. 588-595.

Selection of raw materials, balling and hardening of green pellets, rate of production, effect of the pellets on the operation of blast furnace. Pelletizing with simultaneous performance of special reactions. Tables, photographs, diagrams. 25 ref. (B16, D1, Fe)

161-B. Uranium Recovery Plants. A. Thunaes. *Canadian Mining Journal,* v. 77, June 1956, p. 123-151, 159-161.

Treatment and concentration of Canadian uranium ores at seven sites. (B14, U)

162-B. Size Reduction. R. V. Riley. *Chemical & Process Engineering,* v. 37, June 1956, p. 187-191.

Advances in comminution, including crushing, milling, fine grinding, fluid energy mills and size reduction machinery for special applications. (B13)

163-B. Some Changes in the Properties of Refractories at High Temperatures. C. Bodsworth. *Iron & Steel,* v. 29, June 1956, p. 297-301, 322.

Effect of the continuation of some structural changes, which may not be completed during firing, and of contamination in service. (B19, EG-d)

164-B. Removal of Uranium From Rand Leach Liquors With Anion Exchange Resins. V. Further Studies on Process X Solutions. Norman N. Schiff. *Massachusetts Institute of Technology (U. S. Atomic Energy Commission),* AECD-4108, Mar. 1951, 6 p.

Effects of pH, temperature and retention time of leach liquor on resin capacity and precipitate grade. (B14, U)

165-B. Tests With the Aerofall Mill on a Rand Mine. L. A. Waspe. *Mining Magazine,* v. 94, June 1956, p. 325-334.

Plant layout, operation, production data and costs for milling gold-uranium ores. (B13, A5, U, Au)

166-B. Something New in Sintering. *Steel,* v. 139, July 2, 1956, p. 74, 76.

"Flying Saucer" blending machine and updraft sintering machine are features of new plant. (B16, Fe)

167-B. (Russian.) **New Refractory Materials for Smelting and Casting of High-Melting Metals.** G. V. Samsonov. *Ogneupory,* v. 21, no. 3, 1956, p. 122-135.

Survey of refractory materials for prospective use in smelting of high-melting metals. Bibliography of mostly foreign sources on the subject. (B19, C21, D general)

168-B. Design and Operation of No. 3 Sinter Strand at Jones and Laughlin's Benson Mines. R. G. Fleck and F. M. Hamilton. *American Institute of Mining and Metallurgical Engineers, Blast Furnace, Coke Oven and Raw Materials Conference, Preprint,* 1956, Apr. 1956, 5 p.

Details of installation started in 1952. (B16, A5)

169-B. The Lurgi Sintering Plant of the Steel Company of Canada. T. W. W. Trumper. *American Institute of Mining and Metallurgical Engineers, Blast Furnace, Coke Oven and Raw Materials Conference, Preprint,* 1956, Apr. 1956, 13 p.

Sinter is produced from screened ore, flue dust, mill scale and coke breeze for both blast furnace and openhearth in a plant designed and engineered by the company. (B16, A5, ST)

170-B. Ore Preparation Plant of the Steel Company of Wales Limited: Design, Operation, and Effect on Blast Furnace Performance. K. C. Sharp and H. R. Tufnail. *American Institute of Mining and Metallurgical Engineers, Blast Furnace, Coke Oven and Raw Materials Conference, Preprint,* 1956, Apr. 1956, 17 p.

Production of sinter and its effect on plant practice. (B16, B13, A5, ST)

171-B. Methods for Increasing Production Rate of Flue-Dust Sinter. E. C. Rudolphy and E. J. Whittenberger. *American Institute of Mining and Metallurgical Engineers, Blast Furnace, Coke Oven and Raw Materials Conference, Preprint,* 1956, Apr. 1956, 7 p.

Flue-dust sinter yield is increased by moisture control and additives such as ore fines, roll scale, return fines and granulated blast furnace slag. (B16)

172-B. Reaction Zones in the Iron-Ore Sintering Process. R. D. Burlingame, Gust Bitsianes and T. L. Joseph. *American Institute of Mining and Metallurgical Engineers, Blast Furnace, Coke Oven and Raw Materials Conference, Preprint,* 1956, Apr. 1956, 17 p.

Chemical composition of various zones. (B16, Fe)

173-B. Sintering Iron Ores and Concentrates at Extaca. Robert L. Bennett, Robert E. Hagen and Morris V. Mielke. *American Institute of Mining and Metallurgical Engineers, Blast Furnace, Coke Oven and Raw Materials Conference, Preprint,* 1956, Apr. 1956, 19 p.

Deals with operation of the sintering plant, both on fine iron ore and on magnetite concentrates from taconite. (B16, Fe)

174-B. Weirton's New 8-Foot Wide Iron-Ore Sintering Plant. Julius H. Strassburger. *American Institute of Mining and Metallurgical Engineers, Blast Furnace, Coke Oven and Raw Materials Conference, Preprint,* 1956, Apr. 1956, 9 p.

A new sintering machine and its auxiliary handling and processing equipment. (B16, A5, Fe)

175-B. A Kinetic Study of the Leaching of Molybdenite. William H. Dresher, Milton E. Wadsworth and W. Martin Fassell, Jr. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, June 1956, p. 794-800.

Effects of temperature, oxygen over-pressure and potassium hydroxide concentration evaluated. (B14, Mo)

176-B. Mechanism of Sulfate Formation During the Roasting of Cuprous Sulfide. C. L. McCabe and J. A. Morgan. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, June 1956, p. 800A.

Compositions of the various layers were established by Debye-Scherrer patterns, suggesting a sequence of reactions during roasting. (B15, Cu)

177-B. (Czech.) **Ferrochromium With Low Carbon Content.** Karel Protva. *Hutnik,* v. 6, no. 2, Feb. 1956, p. 41-44.

Methods of preparing a low-carbon ferrochrome. Importance of ferro-alloys as steelmaking additions; standards for them. (B22, B21, Fe-n)

178-B. (French.) **Sulfur Partition Between Gas, Slag, and Metal Phases.** E. T. Turkdogan. *Revue de Métallurgie,* v. 53, no. 5, May 1956, p. 332-342.

Indicates that in iron and steelmaking processes the sulfur transfer to and from the slag and metal phases reaches equilibrium. The sluggishness of the carbon-oxygen reaction, compared with the others taking place at the slag-metal interface, is discussed. (B21, D general)

179-B. (German.) **Contribution to the Development of the Creep Test of Fire-Clay Bricks.** Kamillo Konopicky and Wilhelm Lohre. *Stahl und Eisen,* v. 76, no. 12, June 14, 1956, p. 749-756.

Evaluation of literature on the assessment of the softening behavior of refractory bricks. Main concepts of the creep of ceramic product. Conditions for the performance of creep tests under compression load. Fused silica standards for checking uniform testing temperature. (B19)

180-B. (German.) **Experiences in Changing-Over to Natural Gas Burning in Heating and Melting Furnaces.** Hugo Siegers. *Stahl und Eisen,* v. 76, no. 13, June 28, 1956, p. 805-809.

Characteristics of natural gas and construction of pipe lines. (B18, J2, D2, ST)

181-B. (Hungarian.) **Extraction of Iron From Bauxite by Hydrometallurgy** Zoltan Horvath and Nandor Wieder. *Kohaszati Lapok.* v. 9, no. 4, Apr. 1956, p. 179-182.

Suggestion of method and economic and technical advantages. (B14, Al, Fe)

182-B. (Hungarian.) **New Agents for Promoting High-Speed Settling of Red Mud in the Alumina Industry.** Tihamér Gedeon Jozsef Környei and Imre Veres. *Kohaszati Lapok,* v. 9, no. 4, Apr. 1956, p. 182-184.

Application of ground wild chestnuts, scrap aluminum or its alloy; economic and technical advantages. (B14, Al)

183-B. (Japanese.) **The Magnetic Roasting of the Ni-Cr Iron Ore in South Asia District by Fluidized Bed.** Tetsutaro Mitsuhashi, Manabu Ueno and Minoru Tanaka. *Iron & Steel Institute of Japan, Journal,* v. 42, no. 6, June 1956, p. 461-466.

Report on the operation and advantages in roasting of laterite. The fluidized-bed reactor makes feasible the roasting of fine ores in the stabilized condition and is primarily used in the oxidation roasting of sulfide ores. (B15, Fe)

184-B. New Sintering Plant Facilities at Sparrows Point. Hobart M. Krauer and R. E. Hauser. *Blast Furnace and Steel Plant,* v. 44, July 1956, p. 757-759.

Plant design and operation. (B16, Fe)

185-B. Automatic Mechanism Saves Fuel on Furnaces. W. E. Boger. *Blast Furnace and Steel Plant,* v. 44, July 1956, p. 765-766.

Control system automatically uses all available coke oven gas and adds the amount of base fuel needed for the total B.T.U. input to the furnace. It records all important variables and permits manual operation of fuel valves at any time. (B18, D2, ST)

186-B. (French.) **A Study of Thermal Shock of Refractory Materials.** Marcel Francois. *Chaleur & Industrie,* v. 37, no. 371, June 1956, p. 143-158.

Testing refractory brick for furnace linings. Construction and use of a special burner and metering instrument for performing the tests. The sample is rapidly heated under controlled conditions and then evaluated. (B19)

187-B. (German.) **The Behavior of High-Melting High-Metal Silicides With Respect to Boron, Carbon, Nitrogen and Oxygen.** H. Nowotny, B. Lux and H. Kudielka. *Monatshefte für Chemie,* v. 87, no. 3, Mar. 1956, p. 447-470.

The effect of addition of various elements on the silicides of the transition metals. (B19, Si)

188-B. (Polish.) **Refractory Materials Used in the Casting Industry.** Stanislaw Kobylinski. *Przeglad Odlewnictwa,* v. 6, no. 5, May 1956, p. 139-144.

State standards for refractories in equipment for cast steel and cast iron production. Mechanical properties and service life of quartz fire clay products. Materials for refractories made with silica and other materials. (B19, E11, CI)

189-B. (Spanish.) **Ferromanganese Ores From Portugal.** Joao Manuel

Cotelo Neiva. *Instituto del Hierro y del Acero,* v. 9, no. 45, Apr. 1956, p. 359-363.

Describes deposits of the ores in Portugal, their geology and chemistry. (B10, Fe-n)

190-B. (Spanish.) **Fuels for Furnaces and Their Application.** James L. Adamson and William Somerville. *Instituto del Hierro y del Acero,* v. 9, no. 46, May 1956, p. 512-518.

Application of liquid and gas fuels to different types of furnaces in ferrous and nonferrous industries; examples to show the effect of the type of fuel on the general running of a furnace. (B18, D1, D2, C21)

191-B. (Spanish.) **Modulus of Rupture of Spanish Refractory Materials.** Vincent Gomez Garcia. *Instituto del Hierro y del Acero,* v. 9, no. 46, May 1956, p. 543-547.

Results of determining the modulus of rupture of different types of refractory material (silicon, silicon-aluminum, aluminum, magnesium and chromium-magnesium) produced in Spain. (B19)

192-B. (Spanish.) **Metallographic Study of Renn-Krupp Nodules.** Francisco Munoz del Corral, Jose A. Boned Sopena and Jose M. Bermudez de Castro. *Instituto del Hierro y del Acero,* v. 9, no. 46, May 1956, p. 578-584.

Study of nodules resulting from sintering of mixtures of Spanish iron ores. (B16, M27, Fe)

193-B. Fifty-Hour Load Test for Measuring the Refractoriness of Super-Duty and High-Duty Fireclay Brick. G. R. Eusner and W. H. Schaefer, Jr. *American Ceramic Society Bulletin,* v. 35, July 1956, p. 265-270.

Both types of bricks were tested by the ASTM load tests and by a 50-hr. 2500° F. load test. Kymographs show actual subsidence for brick manufactured in various regions. The test permits direct comparison of super-duty and high-duty brick and provides more accurate predictions of behavior in service. (B19)

194-B. Cananea's Program for Leaching in Place. Robert C. Weed. *Mining Engineering,* v. 8, *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 205, July 1956, p. 721-723.

Construction and operation of both underground and surface leaching plants for copper ores. (B14, Cu)

195-B. Reagent Control in Flotation. C. H. G. Bushell and M. Malnarich. *Mining Engineering,* v. 8, *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 205, July 1956, p. 734-737.

Method of analyzing for xanthate in flotation solutions. There is high correlation of metallurgical results to pH and xanthate concentration. (B14, S11)

196-B. A Kinetic Study of the Leaching of Molybdenite. William H. Dresher, Milton E. Wadsworth and W. Martin Fassell, Jr. *Mining Engineering,* v. 8, *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 205, July 1956, p. 738-744.

Both oxygen over-pressure and potassium-hydroxide concentration control the rate of leaching. (B14, Mo)

197-B. Angle-Transvaal Group Reduction Plant Practice. L. A. Waspe. *Canadian Mining Journal,* v. 77, July 1956, p. 61-66, 76.

In survey of the gold reduction plant practice of the group, the Virginia and Merriespruit plants are described as representative of the most recent developments. (B14, Au)

198-B. Solids-Gas Contacting—Close-Up of a Key Tool in Metallurgy. Raymond E. Vener. *Engineering and Mining Journal,* v. 157, July 1956, p. 78-91.

Analyzes contacting operations and describes commercial equipment for solids-gas contacting. (B14, B15, B16)

199-B. Pilot-Scale Coke Ovens—Development and Operation. R. Tracy Eddinger and J. Mitchell. *Industrial Heating,* v. 23, July 1956, p. 1440-1442.

A pilot-scale test oven was built to determine the effect of coal blends and operating variables on coke quality. Shatter and tumbler data suggest that present test procedures are satisfactory to predict plant-oven carbonization results from test-oven results. (B18)

200-B. Development of the Dwight-Lloyd Sintering Process. H. E. Rowen. *Journal of Metals,* v. 8, July 1956, p. 828-831.

Historical development of ferrous sintering. (B16, ST)

201-B. The Krupp-Renn Process in Czechoslovakia. *Journal of Metals,* v. 8, July 1956, p. 849.

Procedure, advantages and defects of process for concentrating highly acid iron ores. (B14, Fe)

202-B. Agglomeration of Luxembourg and Lorraine Iron Ore Fines. J. Paquet. *Journal of Metals,* v. 8, July 1956, p. 850-851.

Production requirements, chemical analysis and porosity and density data on agglomerates produced by the Dwight-Lloyd and the rotating furnace processes. (B16, Fe)

203-B. Self-Fluxing Agglomerates in the USSR. *Journal of Metals,* v. 8, July 1956, p. 852.

The use of lime agglomerate results in a reduction of coke rates and an increase in the rate of blast furnace output (B16, D1, ST)

204-B. Cyclone Classification and Thickening at Manganese, Inc. S. J. McCarroll. *Mining Congress Journal,* v. 42, July 1956, p. 50-51.

Eight 12-in. cyclones are used to classify 1200 tons of ore per day. Additional cyclones disperse and thicken manganese concentrates. Performance records show capabilities and limitations of equipment. (B14, Mn)

205-B. Metallurgist's View on Milling Base Metal Ores. F. W. McQuiston, Jr. *Mining Engineering,* v. 8, July 1956, p. 699-700.

Best results are obtained by establishing good cooperation with the geologist and the mining engineer. (B13)

206-B. Geologist-Metallurgist Cooperation in Porphyry Copper Exploration. Kenyon Richard. *Mining Engineering,* v. 8, July 1956, p. 703-705.

Limitations of each field, and need for a balance between necessity of desired information and the cost. (B14, Cu)

207-B. Metallurgical Planning in Connection With Lead-Zinc or Lead-Zinc-Copper Mines. M. B. Kildale. *Mining Engineering,* v. 8, July 1956, p. 706-707.

Major contributions of the geologist to metallurgical planning. (B14, Pb, Zn, Cu)

208-B. Progress Report on Uranium Extraction With Organonitrogen Compounds. D. J. Crouse, K. B. Brown, W. D. Arnold, J. G. Moore and R. S. Lowrie. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission),* ORNL-2099, May 1956, 63 p.

Experimental data on a number of compounds. (B14, U)

209-B. Uranium Raw Materials Process Cost Estimates One Through Ten. R. H. Guymon, B. B. Klima, A. D. Ryon, W. T. Ward and R. R. Wiethaup. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission),* ORNL-1998, Nov. 1955, 98 p.

Investigates and evaluates different reagents to extract uranium from the aqueous solutions that are encountered in the processing of uranium ores. (B14, A4, U)

210-B. International Trials of Bricks for All-Basic Furnace Roofs. *Refractories Journal,* v. 32, June 1956, p. 264-267.

Comparisons of ten different brands of bricks show that variations in performance are so small that only a tentative order of merit can be deduced. (B19, D2)

211-B. Mineral-Dressing Investigations of the Recovery of Pyromorphite From a Newton County, Mo., Deposit. D. W. Frommer and M. M. Fine. *U. S. Bureau of Mines, Report of Investigations* 5246, June 1956, 5 p.

The excellent grade of 62.4% lead was attained at a recovery of 44.0% by fatty-acid flotation of a pulp previously deslimed by chemical dispersion and decantation. (B14, Pb)

212-B. Laboratory Concentration of Various Alaska Copper Ores. R. R. Wells. *U. S. Bureau of Mines, Report of Investigations* 5245, June 1956, 9 p.

Preliminary mineral dressing studies on five ore samples. (B14, Cu)

213-B. Investigation of Organic Reagents as Collectors for the Flotation of Uranium Minerals (First Progress Report). J. N. Butler and R. J. Morris. *University of Nevada, U. S. Atomic Energy Commission.* AECU-3137, July 1954, 20 p.

Preliminary results with oxygen-containing uranyl-chelates were negative but information as to active functional groups, types of coordination centers, structural configurations, chelate stability and other factors dealing with surface chemistry was obtained. (B14, U)

214-B. Application in Hydrometallurgy. A. B. Mindler. Paper from "Ion Exchange Technology", Academic Press Inc., p. 285-320.

Historical review, physical, chemical and process limitations, tabulated data on application to various hydrometallurgical problems, process development and new techniques. (B14)

215-B. (Czech.) Making Cast Iron Using Granulated Iron. Bohumil Kroupa. *Hutnik,* v. 6, no. 4, Apr. 1956, p. 117-118.

Iron granules or pellets are excellent for the manufacture of all types or raw irons. They contribute to the uniform quality and desulfurization of raw irons used for steelmaking. (B16, D general, Fe, ST)

216-B. The Concentration of Uranium From Low Grade Ores. T. V. Arden. *Industrial Chemist,* v. 32, May-June 1956, p. 202-209.

List of countries known to be producing uranium from low-grade ores. Physical and chemical methods of concentration, methods for recovering uranium from dilute and impure solutions. (B14, U)

217-B. (French.) **A Study of the Combustion of Coke in the Cupola.** Georges Ulmer. *Fonderie,* no. 125, June 1956, p. 232-237.

A study of means to improve efficiency of the cupola. A coke having a carbon monoxide content as low as possible is necessary and it should have high mechanical resistance. Dense, hard cokes are superior. (B18, E10)

218-B. Ore-Dressing Research in India. *Chemical & Process Engineering,* v. 37, July 1956, p. 228-229.

Research during 1955 was highlighted by a study of the role of depressants in sulfide and silicate flotation, beneficiation of graphite, phosphate rock and chromite by tabling and flotation, upgrading of vermiculite by heavy media separation and tabling, and the differential flotation of beach minerals. (B14)

219-B. Extraction Process for South African Gold-Uranium Ores. A. M. Gaudin, R. Schuhmann, Jr., and J. Dasher. *Mining Engineering,* v. 8, Aug. 1956, p. 802-806.

A complete process for gold and uranium recovery is divided into 16 steps, 6 for gold, 6 for uranium, and 4 to recover the leach acid. (B14, Au, U)

220-B. Oxidized Copper. II. Who Holds the U. S. Deposits? James W. Franklin. *Engineering and Mining Journal,* v. 157, Aug. 1956, p. 80-85.

Survey of U. S. reserves, stating grade and tonnage. (B10, Cu)

221-B. Yugoslavia Seeks Mineral Development. Rikard Marusic and Viktor Kersnic. *Engineering and Mining Journal,* v. 157, Aug. 1956, p. 86-90.

Mineral reserves and production of principal ores in Yougoslavia. (B10)

222-B. Mineral Shortages and Foam Flotation. N. Pilpel. *Research,* v. 9, Aug. 1956, p. 282-288.

Fundamental principles of the process and recent developments in the technique. (B14)

223-B. Development of an Ion Exchange Process for the Recovery of Vanadium. D. C. McLean, E. T. Hollis and R. A. Eisenhauer. *American Cyanamid Company Raw Materials Development Laboratory (U. S. Atomic Energy Commission),* ACCO-63, July 1954, 68 p.

Theory, chemistry and characteristics of a practical recovery process using either columns or resin-in-pulp. (B14, V)

224-B. Proposed Flow Sheet for Recovery of Uranium and Vanadium From Templet Mountain Ore. H. P. Ehrlinger, III, and R. W. Stephens. *University of Nevada (U. S. Atomic Energy Commission),* AECD-3725, Dec. 1953, 17 p.

The ore is floated to produce concentrates and tailings for separate treatment by leaching. The tailings can be readily treated at the mine by pugging with sulphuric acid and leaching to extract 90% of the uranium in this fraction. (B14, U, V)

225-B. (German.) **Determination of the Optimum Moisture Content and Amount of Fuel in Fine Ore Mixtures for Sintering.** Hans Kosmider, Ewald Bertram and Hermann Schenck. *Stahl und Eisen,* v. 76, no. 14, July 12, 1956, p. 858-870.

Methods for controlling the sintering. Determination of air transmission. Effect of additions of chalk and dolomite. Effect of grain size on sinterability. (B16, Fe)

226-B. (German.) **Possibilities of Capacity Increase in Sinter Installations.** Bernhard Weilandt and Walter Storsberg. *Stahl und Eisen,* v. 76, no. 14, July 12, 1956, p. 870-878.

Factors influencing sintering capacity, fine-ore processing for sintering, experiments with granulation, effect of additions and pretreatment. (B16, Fe)

227-B. (Russian.) **Complex Utilization of the Vanadium, Titanium and Iron of Titanomagnetites in Communist China.** I. F. Krasnykh. *Stal',* v. 16, no. 6, June 1956, p. 523-530.

Production of ferroalloys from titanomagnetites by concentration of ore and division into two concentrates, followed by metallurgical methods of processing the ferrovanadic concentrate, and then melting out the ferrovanadium and ferrotitanium. (B14, B22, Fe-n)

228-B. Uranium Metallurgy. A. H. Ross. *Canadian Mining and Metallurgical Bulletin,* v. 49, no. 532, Aug. 1956, p. 570-576.

Principles and new developments, uranium minerals, extraction methods, resin in pulp and pulp in solvent processes, preconcentration methods, Canadian practice and costs. (B14, U)

229-B. The Procurement of Some Hitherto Rare Metals. A. R. Powell.

Chemistry & Industry, no. 31, Aug. 11, 1956, p. 809-812.

Principal sources of the rarer metals, preliminary treatment of raw materials containing them.
(B general, EG-b)

230-B. Application of Steam-Fuel Ratio Control to Open Hearth Operations. W. H. Kahl. *Iron and Steel Engineer,* v. 33, Aug. 1956, p. 72-75; disc., p. 75-77.

Steam-fuel ratio equipment gives more uniform operation, precise control and improved protection. Disadvantages are higher initial cost, additional required accessory equipment, and the more highly skilled personnel required. (B18, D2)

231-B. South Africa: Extraction Process for Gold-Uranium Ores. A. M. Gaudin, R. Schuhmann, Jr., and J. Dasher. *Journal of Metals,* v. 8, sec. 1, Aug. 1956, p. 1065-1069.

Development of uranium dissolving step, separation of residue from concentrated liquor, extraction of uranium from concentrated liquor. (B14, Au, U)

232-B. Refractories for Aluminum and Copper Production. W. F. Rochow and C. A. Brashares. *Journal of Metals,* v. 8, sec. 1, Aug. 1956, p. 1070-1073.

The choice of refractories for most furnace equipment used in aluminum production, while largely standardized, is, nevertheless, the subject of continuing research and service trials for selection of those refractories which will provide the best service. (B19, C21, Al, Cu)

233-B. Flocculation of Mineral Suspensions With Coprecipitated Polyelectrolytes. Milton E. Wadsworth and Ivan B. Cutler. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, sec. 1, Aug. 1956, p. 1092-1095.

Coprecipitation of anionic and cationic poly-electrolytes was applied to flocculation of several mineral systems. Results obtained in a study of the flocculation of kaolinite and hematite suspensions of polycationic and polyanionic electrolytes are presented. (B14)

234-B. Kinetics of the Oxidation of Galena in Ammonium Acetate Solutions Under Oxygen Pressure. D. P. Seraphim and C. S. Samis. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, sec. 1, Aug. 1956, p. 1096-1099.

Experimental materials, equipment and procedure.
(B14, R2, Pb)

235-B. Equilibrium Considerations in the Roasting of Metallic Sulfides. Herbert H. Kellogg. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, sec. 1, Aug. 1956, p. 1105-1111.

A method of calculation which combines the equilibrium and stoichiometric factors is outlined and illustrated by an example from the roasting of Cu-Fe sulfides.
(B15, Cu, Fe)

236-B. Froth Flotation: A Half-Century Review. P. F. Whelan. *Industrial Chemist,* v. 32, Aug. 1956, p. 315-318.

Early history and principles underlying flotation. Reclamation of metallic substances. (To be continued.) (B14)

237-B. Metallurgical Practice on the Kolar Gold Field. F. N. Cholmeley. *Mine & Quarry Engineering,* v. 22, Sept. 1956, p. 366-371.

Covers concentration techniques by flow sheets and photographs.
(B14, Au)

238-B. (Czech.) **On the Problem of Producing Self-Fluxing Sinter.** Josef Duda. *Hutnické Listy,* v. 11, no. 8, Aug. 1956, p. 461-467.

Experiments made with an agglomerated mixture of Krivoj Rog ore, blast furnace flue dust and calcined pyrites. (B16, Fe)

239-B. (French.) **Two Years of Practice in the Washing of 1/10 Fines With Thick Liquor.** H. Baudoux. *Annales des Mines de Belgique,* Special No., June 1956, p. 24-28, disc., 28-30.

Use of a Humboldt washer for magnetite treatment. Tables of results from September 1954 to February 1956. (B14, Fe)

240-B. (German.) **The "Three Products" Heavy Media Separation of Siderite at "Alte Hütte".** W. Borek and F. W. Mayer. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 9, no. 8, Aug. 1956, p. 363-367.

Construction and operation of a "Heberad" separator for concentrating siderite with a density of 3.55 and a 6 mm. grading. (B14, Fe)

241-B. (Hungarian.) **Utilization of Aluminum Scrap in Accelerating the Settling of Red-Mud.** Kohaszati Lapok, v. 11, no. 7, July 1956, p. 324-326.

Hungarian experiments for comparing the settling action of flour and aluminum additions.
(B14, A8, Al, Fe)

242-B. (Italian.) **The Ion Exchange Resins and Their Use in the Metallurgy of Uranium.** R. De Leone. *Energia Nucleare,* v. 3, no. 3, June 1956, p. 168-175.

Characteristics of the resins, methods and apparatus used in the production of crude salts of uranium. (B14, U)

243-B. (Italian.) **The Extraction of Uranyl Nitrate With Organic Solvents. I. Methyl-Isobutyl-Ketone.** A. Cacciari, R. De Leone, C. Fizzotti and M. Gabaglio. *Energia Nucleare,* v. 3, no. 3, June 1956, p. 176-181.

Influence of the presence of nitric acid. Extraction of ferric nitrate by the same method in the presence of sulfates, phosphates and chlorides. (B14, U)

244-B. (Book.) **An Introduction to Mineral Dressing.** E. J. Pryor. 649 p. 1955. Mining Publications, Ltd., Salisbury House, London, E.C. 2, England. $9.80.

Basic principles underlying sound milling practice; their relation to standard commercial concentrating operations. (B13, B14)

245-B. (Book-German.) **Introduction to Metallurgy.** Rudolf Vogel. 169 p. 1955. Musterschmidt-Verlag, Gottingen, Germany.

Metal deposits and their exploitation; pyrites; metallic oxides. High-temperature reactions of nonmetallic elements in metals. Electrolytic separation; refining; furnaces. Metallurgy of various metals, nonferrous and ferrous.
(B general, C general, D general)

246-B. (Book-Italian.) **The Study Center for Ore Dressing.** Luigi Usoni. 27 p. + 21 plates. 1956. Consiglio Nazionale Delle Ricerche, Rome, Italy.

Flotation, concentration, and processing of poor ores. Pilot-plant investigations. (B14)

247-B. Magnetite Concentrates to Supplement High-Grade Iron Ore. E. C. Wright. *Metal Progress,* v. 70, Sept. 1956, p. 97-102.

One plant will make 3,500,000 tons of 63% iron pellets in 1956 as concentration of low-grade ores increases. (B13, B14, B16, Fe)

248-B. (Spanish.) **Physical Properties of the Iron Ores of Sierra Menera, Vivero and of the Coto de Orconera Mine and Their Sintering.** Jose A. Boned Sopena. *Instituto del Hierro y del Acero,* v. 9, no. 48, July 1956, p. 841-857.

Porosity, permeability and mechanical resistance of the ores. The influence of their thermic behavior on the sintering process.
(B16, P10, Fe)

249-B. Nickel Recovery at Fort Saskatchewan. J. P. Warner. *Industrial Chemist,* v. 32, Sept. 1956, p. 359-368.

Process used for recovering nickel from a concentrate by an ammonia pressure leach process. Describes plant in which this process is applied industrially.
(B14, Ni, Cu, Co)

250-B. J & L's Star Lake Sinter Strand. R. G. Fleck and F. M. Hamilton. *Mining Engineer,* v. 8, Sept. 1956, p. 901-903.

Sintering machine and its operation, raw materials, two-layer charge system. (B16, Fe)

251-B. Hydrometallurgy of Uranium. R. A. Foos. *Mining Engineering,* v. 8, Sept. 1956, p. 893-900.

Current progress on the application of liquid extraction indicates that it could soon replace the ion-exchange technique. Both systems described. (B14, U)

252-B. Preliminary Report on the Isolation and Separation of Niobium and Tantalum Pentoxides From Mineral Concentrates by Liquid-Liquid Extraction. G. H. Faye and W. R. Inman. *Canada, Department of Mines and Technical Surveys, Mines Branch Research Report No.* MD210, Aug. 1956, 17 p.

A mixture of hydrofluoric and nitric acids is used in all essential steps of the process. (B14, Cb, Ta)

253-B. Utilizing Offgrade Manganese Materials From Montana. W. A. Stickney and W. E. Anable. *U. S. Bureau of Mines, Report of Investigations* 5255, Aug. 1956, 21 p.

Raw materials, pilot plant flotation tests, smelting tests, separation of iron from flotation concentrate. (B14, C21, Fe, Mn)

254-B. Mineral Dressing Studies on the Great Gossan Lead Ore From Carroll County, Virginia. M. P. Corriveau. *Virginia Polytechnic Institute, Bulletin, Engineering Experiment Station Series No.* 113, v. 49, no. 11, Sept. 1956, 79 p.

Description of ore sample; flotation investigations; recommendations for future work. (B14, Pb)

255-B. Evolution of Iron Ore Beneficiation Processes. Stephen E. Erickson. *Blast Furnace and Steel Plant,* v. 44, Oct. 1956, p. 1159-1167.

Graphic description of ore shipments, prices, analyses. Changes in plant layout and processing procedures. (To be continued.)
(B14, A4, Fe)

256-B. Studies on the Beneficiation of Low Grade Beryl Ores by Flotation. N. R. Srinivasan and H. S. Aswath. *Indian Institute of Science, Journal,* v. 38, sec. B, July 1956, p. 135-142.

Tests revealed no selective separation in the case of froth flotation of quartz; good separations were obtained in the case of beryl.
(B14, Be)

257-B. Modernization of Bunker Hill Presintering Practices. Harold E.

Lee and Donald Ingvoldstad. *Mining Engineering;* v. 8, *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 205, Oct. 1956, p. 1001-1005.

New crushing, storage-proportioning-blending, bedding and pelletizing plants were designed and constructed for preparation of suitable presintering materials. (B14, B13, B16, Pb, Ag)

258-B. Preconcentration of Primary Uranium Ores by Flotation. Burt C. Mariacher. *Mining Engineering,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 205, Oct. 1956, p. 1006-1007.

Flotation process was developed that fulfilled the concentration objectives for low-grade ores. Pilot plant testing was used to verify results obtained from laboratory batch testing. (B14, U)

259-B. Flotation of Secondary Uranium Minerals. John N. Butler and Robert J. Morris. *Mining Engineering,* v. 8; *American Institute of Mining and Meallurgical Engineers, Transactions,* v. 205, Oct. 1956, p. 1008-1011.

Additions of certain base metal salts aided in recovery and materially increased the rate of flotation and selectivity of the collectors for the synthetic minerals. (B14, U)

260-B. How Anaconda Recovers U_3O_8 From Sandstone Ore at Bluewater Mill. George O. Argall, Jr., *Mining World,* v. 18, Oct. 1956, p. 46-51, 91.

Anaconda mill development and expansion, equipment design, neoprene lining, ore processing, metallurgical advances, mill processes and procedures. (B14, U)

261-B. The Solvent-Solvent Extraction of Uranium From Sulfuric Acid Solutions With Oil Soluble Amines. Al Preuss and Jean Saunders. *Rohm and Haas Company Research Laboratories (U. S. Atomic Energy Commission),* RMO-2533, Apr. 1955, 39 p.

Use of liquid amines in a kerosene diluent for extraction of uranium from sulfuric acid leach solutions is possible. The most promising amines were studied to determine optimum operating conditions. (B14, U)

262-B. (Spanish.) **Industrial Production of Uranium.** Jovino D. Pedregal. Paper from "XXVIII Congreso Internacional de Quimica Industrial". v. I. Saez, p. 489-492.

Several suggestions on the purity to be expected from metallic uranium, especially before metallurgical treatment. Spanish methods for purification of uranium compounds. (B14, U)

263-B. Development of Ore Dressing Procedures for Canadian Ores. L. E. Djingheuzian. *Canadian Mining Journal,* v. 77, Oct. 1956, p. 75-81.

Notes on dressing procedures for recovery of 12 different metals obtained in ores from several sources. (B13, B14)

264-B. The Reproducibility of Test Results in an Experimental Sinter Box. C. Lang and J. M. Ridgion. *Iron and Steel Institute, Journal,* v. 184, Oct. 1956, p. 172-177.

Better results were obtained with the segregated feed box and with the deeper beds. (B16, Fe)

265-B. Selective Extraction of Mercury and Antimony From Cinnabar-Stibnite Ore. E. G. Erspamer and R. R. Wells. *U. S. Bureau of Mines, Report of Investigations* 5243, Sept. 1956, 15 p.

Bulk flotation of sulphides, followed by furnacing of the concentrate with carefully regulated admission of air, yields over 95% of the mercury and permits possible recovery of antimony from the furnace calcine. Leaching of ores or concentrates with sodium sulphide solution is a potential means of obtaining separate mercury and antimony products. (B14, Hg, Sb)

266-B. The Extraction of Uranium From a Saskatchewan Pegmatite Granite. Brad Gunn, S. D. Cavers, and A. B. van Cleave. *Canadian Journal of Technology,* v. 34, Nov. 1956, p. 379-388.

Extensive leaching tests were carried out and possible methods of recovering the uranium from the pregnant leach solution studied. (B13, B14, U)

267-B. Modernization of Bunker Hill Presintering Practices. Harold E. Lee and Donald Ingvoldstad. *Journal of Metals,* v. 8, sec. 1; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Oct. 1956, p. 1469-1473.

New plant of four distinct units: crushing plant; storage, proportioning and blending plant; bedding plant; and a pelletizing plant. (B13, B16)

SECTION C

NONFERROUS EXTRACTION and REFINING

1-C. Vacuum Melting Furnaces—An Interim Report. Frank Chesnut. *Metal Progress,* v. 68, Nov. 1955, p. 118-123.

Modern induction furnaces which can make 1000-lb. ingots, and others for arc melting in vacuo such difficult metals as molybdenum and titanium. Photographs, diagram. (C25, D8, Mo, Ti)

2-C. Titanium Plant at Boulder City, Nev.: Its Design and Operation. C. T. Baroch, T. B. Kaczmarek, W. D. Barnes, L. W. Galloway, W. M. Mark and G. A. Lee. *U. S. Bureau of Mines, Report of Investigations* 5141, Sept. 1955, 76 p.

Process based on reduction of titanium tetrachloride with magnesium. Tables, diagrams, photographs. 17 ref. (C4, Ti)

3-C. (Russian.) **Calculation of the Solidification Kinetics of a Metal Ingot at Various Temperature Conditions on Its Surface.** V. T. Borisov, B. Ia. Liubov and D. E. Temkin. *Doklady akademii nauk SSSR,* v. 104, no. 2, Sept. 11, 1955, p. 223-226.

Solution for the displacement of the recrystallization front in a solidifying ingot. Graphs. 3 ref. (C5, D9, N12)

4-C. Recovery of Metallic Zinc From Dross and Skimmings. G. Lorber. *Henry Brutcher Translation No.* 3413, 6 p. (From *Metallwissenschaften und technik,* v. 5, nos. 13-14, 1951, p. 291-292.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 107-C, 1951. (C22, A8, Zn)

5-C. (Hungarian.) **Experiences With Retorts in Silicon-Thermal Magnesium Metallurgy.** Lajos Pilissy. *Kohaszati lapok,* v. 10, no. 10, Oct. 1955, p. 454-457.

Review of various methods on basis of literature. Outline of Hungarian experiments necessary for determinating proper method and alloy to be used. Tables, graph, diagram. 4 ref. (C21, Mg)

6-C. Induction-Melted Zirconium and Zirconium Alloys. H. A. Saller, R. F. Dickerson and E. L. Foster, Jr. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* BMI-908, Mar. 1954, 38 p.

Melting and fabrication techniques; data on hardness, electrical resistivity, corrosion behavior in steam and water, drawability. Photographs, tables, graphs. 8 ref. (C21, Q29, R4, G4, P15, Zr)

7-C. Ultra-Pure Solids for Electronics. Max M. Grandsen. *Canadian Chemical Processing,* v. 39, Nov., 1955, p. 43-46.

Processing germanium for making a transistor. Photographs, graph. 3 ref. (C general, T1, Ge)

8-C. Preparation of High-Purity Thorium by the Iodide Process. N. D. Veigel, E. M. Sherwood and I. E. Campbell. *Electrochemical Society, Journal,* v. 102, Dec. 1955, p. 687-689.

Describes van Arkel-de Boer process. Substantial reduction in the nonmetallic content over that of the feed material was obtained. Determination of optimum deposition conditions. Photographs, tables. (C4, Th)

9-C. Impurties in Copper-Base Alloys. Frank J. Versagi. *Foundry,* v. 83, Dec. 1955, p. 98-107.

Survey of effects, detection and removal of aluminum, antimony, iron, lead, nickel, phosphorus, manganese, silicon, sulphur, tin, zinc and gases. Tables, photographs. 47 ref. (C general, Cu)

10-C. INCO Develops New Oxygen Flash Smelting Process to Treat Copper Sulphide Concentrates. *INCO,* v. 26, no. 6, Oct. 1955, p. 2-5.

Furnace gases recovered for use

in making liquid sulfur dioxide and sulfuric acid. Photographs. (C21, Cu)

11-C. Conversion of Zirconium Sulfates to Anhydrous Zirconium Tetrafluoride. G. H. Beyer, E. L. Koerner and E. H. Olson. *Iowa State College, Ames Laboratory (U. S. Atomic Energy Commission),* ISC-634, Aug. 1955, 25 p.

Production of zirconium tetrafluoride suitable for making soft zirconium metal. Quality of the zirconium metal was dependent upon the purity of the fluoride employed in the reduction. Graphs, table, diagram, flowsheets. 13 ref. (C4, Zr)

12-C. Melting of High Purity Uranium. Bernhard Blumenthal. *Journal of Metals,* v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Nov. 1955, p. 1199-1205.

High-purity electrolytic uranium crystals converted into sound ingots by melting in a high vacuum. Directional solidification results in better than 99.993 weight % purity. Micrographs, diagrams, tables. 13 ref. (C5, C25, U)

13-C. Extraction of Lithium From Its Ores. Reuben B. Ellestad and Fremont F. Clarke. *Mining Engineering,* v. 7, Nov. 1955, p. 1045-1047.

Lithium chemical plant extraction methods discussed with reference to base exchange with alkali sulphates; processing based on roasting with lime; miscellaneous methods; application of the Lithium Corp. process to extraction of lithium from run-of-mine, low-grade spodumene ore or concentrates. 16 ref. (C general, Li)

14-C. Meeting the Requirements for Pure Electronic Metals. Robert J. Anderson. *Mining World,* v. 17, Dec. 1955, p. 61-63.

Survey of various methods of purifying metals. Photographs. 2 ref. (C general)

15-C. Separating and Purifying Reactor Fuel From Uranium-Ore Concentrates. Wilbur E. Kelley. *Nucleonics,* v. 13, Nov. 1955, p. 68-71.

Present and past methods, possible future improvements in feed materials operations (processing high-grade ores and ore concentrates to produce metallic uranium or uranium fluoride gas). Diagrams. 5 ref. (C general, U)

16-C. (English.) Zone-Melting Processes Under Influence of the Atmosphere. J. van den Boomgaard. *Philips Research Reports,* v. 10, Oct. 1955, p. 319-336.

Shows that it is possible to bring a volatile impurity element homogeneously into an ingot by means of zone melting under a constant vapor pressure of that element. Diagrams, graphs. 6 ref. (C5)

17-C. Aluminothermics: "Thermit" and Its Applications. H. Stanley Redgrove. Paper from "Industrial & Manufacturing Chemistry. Pt. II. Inorganic". v. II. Philosophical Library, Inc., p. 67-76a.

Preparation of metals and alloys by Goldschmidt reaction, uses of "Thermit" as heating agent and source of molten steel, and use of "Thermit" slag. Tables. 8 ref. (C26)

18-C. Zirconium Production Methods. S. M. Shelton, editor. Paper from "The Metallurgy of Zirconium". National Nuclear Energy Series, Division VII—v. IV. McGraw-Hill Book Co., p. 59-134.

Thermodynamic properties of zirconium compounds, Kroll and other processes, hafnium removal. Diagrams, tables, photograph, graph. 145 ref. (C general, P12, Zr)

19-C. Iodide-Decomposition Process for Production of Zirconium. Z. M. Shapiro. Paper from "The Metallurgy of Zirconium". National Nuclear Energy Series, Division VII—v. IV. McGraw-Hill Book Co., p. 135-215.

Equipment and methods for production of ductile metal from Kroll sponge. Diagrams, photographs, graphs, tables. 56 ref. (C4, Zr)

20-C. Melting and Shaping of Zirconium and Its Alloys. R. B. Gordon, editor. Paper from "The Metallurgy of Zirconium". National Nuclear Energy Series, Division VII—v. IV. McGraw-Hill Book Co., p. 216-306.

Arc, induction, resistance, drip and autocrucible melting. Fabrication methods including rolling, extrusion, swaging, drawing, powder metallurgy. Photographs, diagrams, graphs, micrographs, tables. 105 ref. (C21, F general, H general, Zr)

21-C. Solvent Extraction of Uranium (and Vanadium) From Acid Liquors with Trialkylphosphine Oxides. C. A. Blake, K. B. Brown and C. F. Coleman. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission),* ORNL-1964, Aug. 1955, 106 p.

A number of symmetrical phosphine oxides were prepared and examined systematically for their ability to extract uranium from acidic nitrate, chloride, sulfate and phosphate solutions and mixtures thereof. Most of the compounds tested showed high affinity for uranium, excellent extractions being obtained from nitrate and chloride

solutions, and under the proper conditions from sulfate solutions, including a wide variety of solutions in which the structurally similar tri-alkylphosphates are ineffective. Tables, diagrams, graphs. 37 ref. (C general, U, V)

22-C. (Czech.) **Semicontinuous Casting of Ingots of Nonferrous Metals.** Rudolf Soucek. *Hutnik,* v. 5, no. 7, July 1955, p. 205-208.

Design and operation of Czech equipment for casting aluminum and aluminum-alloy ingots. Operation and charging of furnaces used in this type of installation. Diagrams. (C5, Al)

23-C. (French.) **Preparation of Platinum Metals.** P. Egré. *Revue de métallurgie,* v. 52, no. 9, Sept. 1955, p. 691-697.

Survey of recent developments in preparation of platinum, palladium, rhodium, indium, ruthenium and osmium. Photograph, tables, graph. (C28, EG-c)

24-C. (Swedish.) **Problems in the Production of Titanium.** Gotthard Björling. *IVA tidskrift för teknisk-vetenskaplig forskning,* v. 26, no. 6, 1955, p. 252-257.

Titanium tetrachloride, as the intermediate compound, is reduced by magnesium or sodium after refining. The sponge is melted and cast in a vacuum arc furnace. (C26, C21, Ti)

25-C. **Refining Antimony by Electrodeposition and by Distillation.** R. R. Rogers and R. A. Campbell. *Canada, Department of Mines and Technical Surveys, Mines Branch, Technical Paper No.* 11, 1955, 14 p.

Degree of refinement by distillation, electrodeposition, and combination of the methods varied with the crude material and refining methods used. Tables, photographs, diagram. 6 ref. (C23, C22, Sb)

26-C. **Recent Developments in the Processing of Uranium Ores and Their Significance in the Extractive Metallurgy of Metals.** R. R. Grinstead. *Dow Chemical Company, Western Division (U. S. Atomic Energy Commission,* AECU-3071, Sept. 1955, 33 p.

Application of the techniques of solvent extraction processing, possibility of relating uranium recovery developments to methods of extracting other metals from their ores. Diagrams, graphs. (C general, U)

27-C. **Continuously Cast Large Bronze Shapes.** *Iron Age,* v. 176, Dec. 8, 1955, p. 143-145.

Water-cooled graphite dies and gravity-feed, bottom-flow casting technique produces large bronze bearings, bushings, gears, and other parts that can be machined with minimum waste of time and material. Photographs. (C5, G17, Cu)

28-C. **Preparation and Chlorination of Titaniferous Slag From Idaho Ilmenites.** Alva H. Roberson and Lloyd H. Banning. *Journal of Metals,* v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Dec. 1955, p. 1335-1342.

Magnesite-lined furnace proved to be more satisfactory for smelting ilmenite in a continuous dry top electric smelting operation than did a carbon-lined furnace. Photographs, tables, diagram. 3 ref. (C21, Ti)

29-C. **Electrolysis of Carbonate Leach Solutions.** John C. Huggins. *Merrill Company (U. S. Atomic Energy Commission),* RMO-2607, July 1952, 23 p.

Results demonstrate feasibility of a diaphragm cell for recovery by electrolysis of both vanadium and uranium. Solutions may be derived from the electrolytic operation which are suitable for re-use in a practical cyclic leaching process. Graphs, table. (C23, B14, V, U)

30-C. **Production of Hafnium.** H. P. Holmes, M. M. Barr and H. L. Gilbert. *U. S. Bureau of Mines, Report of Investigations* 5169, Nov. 1955, 33 p.

With slight modifications, Kroll-process equipment for producing zirconium can be used to produce tonnage quantities of hafnium. Arc-melted metal can be forged and rolled to sheet. Photographs, diagrams, tables. 13 ref. (C4, C26, F22, F23, Hf)

31-C. (French.) **Research on the Preparation, by Fused Electrolysis, of Germanium and Some of Its Binary Alloys With the Transition Metals.** Marie-Jeanne Barbier-Andrieux. *Annales de chimie (Paris),* v. 10, Sept.-Oct. 1955, p. 754-806.

Three new methods of preparing germanium consist in electrolyzing sodium digermanate with possible addition of sodium fluoride, germanium oxide dissolved in fused alkaline silicates or germanium oxide dissolved in fused sodium borosilicate. Tables, graphs, photographs. 58 ref. (C23, Ge)

32-C. (German.) **Electrolytic High-Grade Purification by Liquid Electrodes.** A. Gaumann. *Schweizer Archiv für angewandte Wissenschaft*

und Technik, v. 21, no. 10, Oct. 1955, p. 337-342.

Use of liquid electrodes for purification and separation of metals. Process has been applied to ten metals so far. Indium for example, has been obtained with a purity as high as 99.99995%. Graphs, diagrams. (C23, In)

33-C. (Hungarian.) **Some New Data on the Cryolite Baths in Aluminum Metallurgy.** Elemér Papp. *Magyar Kémikusok Lapja,* v. 10, no. 11, Nov. 1955, p. 352-353.

Problems of synthetic cryolite; manufacturing suggestions. Tables. 9 ref. (C23, Al)

34-C. (Russian.) **Vacuum Method of Eliminating Zinc From Brasses.** D. N. Klushin, I. A. Bibina, and K. G. Bogatina. *Zhurnal prikladnoi khimii,* v. 28, no. 11, Nov. 1955, p. 1242-1246.

Relation of degree of dezincification to time and temperature. Method has advantages of operational efficency and minimum losses of desired metals in the alloy. Diagram, tables, graphs. (C25, Cu)

35-C. Radiochemically Pure Cerium. New Specification of Chemical Purity. Murrell L. Salutsky, H. W. Kirby and Laurence L. Quill. *Analytical Chemistry,* v. 27, Dec. 1955, p. 1960-1962.

Radiochemically pure cerium, as a carrier for tri and quadri-valent ions in extremely low-level radiochemical analyses, prepared by fractional precipitation of the iodate from homogeneous solution, and by fractional crystallization of the double magnesium nitrate and of ceric ammonium nitrate. Tables, graphs, diagram. 5 ref. (C4, Ce)

36-C. A Nuclear Power Plant. Christopher Hinton. *Chemical Trade Journal and Chemical Engineer,* v. 137, Dec. 2, 1955, p. 1504, 1506, 1508.

Design and construction of an English reactor for production of plutonium. (C general, Pu)

37-C. Sodium Uranium (IV) Fluoride; Precipitation and Reduction to Metal. W. B. Tolley. *Hanford Atomic Products Operation (U. S. Atomic Energy Commission),* HW-39087, Sept. 1955, 13 p.

Determines possibility of precipitating a uranium sodium salt from uranyl solution to obtain some solubility data during precipitation. Classifies structure of compound obtained. Tables, photograph. 5 ref. (C4, U)

38-C. Continuous Electrolytic Tests. John C. Huggins, Robert A. Carlson and Irwin F. Schwien. *Merrill Company (U. S. Atomic Energy Commission),* RMO-2612, Feb. 1954, 17 p.

Results of operation of a four-stage, continuous laboratory electrolytic unit to recover uranium and vanadium from Monticello carbonate leach solutions. Three runs of 72, 35 and 47 hr. reported, with recoveries of 76 to 90% of the vanadium and 99% of the uranium. Diagrams, table. (C23, U, V)

39-C. The Extraction and Refining of Metals. B. Fullman and F. D. Richardson, editors. Paper from "Reports on the Progress of Applied Chemistry". v. XXXIX. Society of Chemical Industry, p. 129-161.

Survey of advances in inorganic systems and basic physical chemistry. Recent technological advances with the most important metals. 267 ref. (C general)

40-C. Amine Extraction Processes for Uranium Recovery From Sulfate Liquors. D. J. Crouse and K. B. Brown. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission),* ORNL-1959, v. 1, Sept. 1955, 79 p.

Bench scale studies were made of processes for recovery of uranium from ore leach liquors by solvent extracting with long chain amines in an organic diluent. Several process schemes have been evaluated which show considerable promise both from the standpoint of operation and chemical costs. Diagrams, tables, graphs. 10 ref. (C28, U, Th, V, Fe, Be)

41-C. (German.) **Fusion Electrolysis of Lithium Chloride.** G. Parissakis and W. D. Treadwell. *Helvetica Chimica Acta,* v. 38, no. 7, 1955, p. 1749-1756.

Solid reactions of transformation for lithium carbonate and phosphate into lithium chloride or bromide. Calculation of potassium solubility in lithium at 405° C. (C23, Li)

42-C. (Italian.) **Purity of Metals.** Giuseppe Pani. *Fonderia,* v. 4, no. 10, Oct. 1955, p. 465-469.

Production methods, characteristic properties, fields of application. Tables, diagrams, graphs. 3 ref. (C general, Al, Mg)

43-C. Feed Materials Production—New Opportunity for Uranium Men. Wilbur E. Kelley. *Engineering and Mining Journal,* v. 157, Jan. 1956, p. 78-84.

Developments in production of feed materials and influence it may have on private industry in uranium processing. Diagrams, photograph, table. (C general, U)

44-C. Solubility Data for Aluminum Reduction Systems. Jack L. Henry and W. M. Lafky. *Industrial and Engineering Chemistry,* v. 48, Jan. 1956, p. 126-128.

Periodical feeding of alumina, as concentration is depleted, improves solubility values. Survey to show effect of salt additives on solubility of alumina in molten cryolite. Table, diagram, graph. 6 ref. (C23, Al)

45-C. Electromagnetic Suspension of a Molten Zone. W. G. Pfann and D. W. Hagelbarger. *Journal of Applied Physics,* v. 27, Jan. 1956, p. 12-18.

New method of container-free zone melting, based on electromagnetic suspension, avoids certain limitations of existing methods. Diagrams, graphs, photograph. 11 ref. (C5)

46-C. Metals of High Purity. J. C. Chaston. *Metal Progress,* v. 69, Jan. 1956, p. 64-67.

Five chemical and six thermal methods for driving solid and gaseous impurities down to low amounts; purity of the various metals refined by these methods tabulated. Tables. (C general)

47-C. Electrodeposition of Some of the Less Common Metals From Nonaqueous Media. Abner Brenner. *Record of Chemical Progress,* v. 16, no. 4, 1955, p. 241-269.

Production of metals by electrolysis, procedures and chemistry involved in electrodeposition of metals from fused salts and electrodeposition of nonaqueous metal from organic baths. Diagrams, graphs, micrograph, photographs, tables. 50 ref. (C23, L17)

48-C. Magnesium From Olivine Via Chlorination: A Possibility. Kermit B. Bengtson. *Trend in Engineering (University of Washington),* v. 8, Jan. 1956, p. 21-26, 35-36.

Chemical properties of olivine and mechanism of chlorination reactions. Diagrams, micrographs, graph, table. 17 ref. (C4, Mg)

49-C. The Preparation of Cerium by Electrolysis of Molten Salts. E. D. Eastman, B. J. Fontana, C. D. Thurmond and W. K. Wilmarth. *U. S. Atomic Energy Commission,* TID-5212, Sept. 1955, p. 14-24.

Development of method for preparing single ingots of pure cerium in amounts up to 100 g. with high net efficiency. Electrolysis was performed in the $CeCl_3$-CaF_2-LiF and $CeCl_3$-KCl-LiCl systems. Tables. 10 ref. (C23, Ce)

50-C. Preparation of Cerium by Chemical Reduction in Open Crucibles in an Inert Atmosphere. E. D. Eastman, W. D. Gwinn, and D. D. Cubicciotti. *U. S. Atomic Energy Commission,* TID-5212, Sept. 1955, p. 25-31.

With pure cerium chloride, a 99% yield of metallic cerium was obtained. Diagram, tables. 2 ref. (C26, Ce)

51-C. The Production of Cerium in the Massive Metallic State. W. H. Keller, Robert P. Ericson and Clifford Hach. *U. S. Atomic Energy Commission,* TID-5112, Sept. 1955, p. 32-36.

Procedure for bomb reduction of cerous chloride with magnesium or calcium to produce 90% yields of metallic cerium. Boosters of dry iodine or iodine and potassium perchlorate were used. Lanthanum was similarly produced. Diagrams, table. 10 ref. (C26, Ce, La)

52-C. The Casting of Cerium and Some Properties of the Cast Metal. David Peterson, Ward Lyon and W. H. Keller. *U. S. Atomic Energy Commission,* TID-5212, Sept. 1955, p. 37-40.

Casting of metallic cerium produced in a vacuum by reduction of anhydrous cerium chloride, with calcium, using iodine as a booster. Properties, working, fabrication. Diagram. 6 ref. (C25, C5, Ce)

53-C. The Production of Beryllium by the Metallothermic Reduction of Beryllium Fluoride. F. H. Spedding, H. A. Wilhelm, W. H. Keller and Charles Neher. *U. S. Atomic Energy Commission,* TID-5212, Sept. 1955, p. 43-48.

Both closed bomb and open reaction chamber methods investigated. Clean massive metal best produced by reaction of beryllium fluoride and magnesium in graphite crucibles, with a calcium chloride booster. 11 ref. (C26, Be)

54-C. Production of Beryllium Metal Ingots for Extrusion. C. B. Sawyer and C. H. Tower. *U. S. Atomic Energy Commission,* TID-5212, Sept. 1955, p. 67-73.

Method for production of sound, high-density ingots for extrusion and machining. Vacuum cast metal was superior in quality to centrifugally cast, but both were superior to air cast. Diagram, photographs. 1 ref. (C5, Be)

55-C. Keynote Address. The Bright Spark in the Metals Industry. James D. Nisbet. Paper from "Vacuum Metallurgy". Electrochemical Society, Inc., p. 1-11.

History and development of vacuum melting of metals. Photographs, diagrams, graph. (C25, D8)

56-C. Arc Melting in High Vacuum. P. C. Rossin. Paper from "Vacuum

Metallurgy". Electrochemical Society, Inc., p. 12-23.

Factors associated with arc stability and control and their influence on the melting practice. Presents a qualitative analysis of the thermal equilibrium associated with the cathode, arc column, anode and mold-metal interface. Micrographs, diagrams, graph. 3 ref. (C25)

57-C. Vacuum Melting of High-Alloy Materials. H. R. Spendelow, Jr., I. S. Servi and G. A. Fritzlen. Paper from "Vacuum Metallurgy". Electrochemical Society, Inc., p. 24-34.

Investigation of reactions during vacuum melting and its effect on mechanical properties of Hastelloy Alloy R-235. Advantages of process. Tables, graphs, micrographs. 3 ref. (C25, Ni)

58-C. The Design and Operation of an Induction and a Resistance Furnace for High-Vacuum, High-Temperature Applications. R. F. Domagala and D. J. McPherson. Paper from "Vacuum Metallurgy". Electrochemical Society, Inc., p. 67-71.

Two improved furnaces designed for alloy melting-point determinations and isothermal heat treatments at temperatures from 1500 to 2500° C. under high-vacuum conditions. Portable vacuum unit designed to continuously evacuate the furnaces described. Diagrams. 2 ref. (C25, C21, J general)

59-C. The Economics of Vacuum Melting. G. Jewett Crites. Paper from "Vacuum Metallurgy". Electrochemical Society, Inc., p. 97-99.

Comparison made with melting in atmospheric induction furnace. Higher costs of melting in a vacuum furnace, which result from the increasing number of operations required, cost of vacuum equipment and of power used by the vacuum pumps, may be offset by increased yields due to absence of slag and maintenance of chemical composition. Table. (C25)

60-C. Deoxidation of Vacuum-Melted M 252. W. F. Moore and R. K. McKechnie. Paper from "Vacuum Metallurgy". Electrochemical Society, Inc., p. 100-105.

Use of various deoxidizers and methods of carrying out deoxidizing reactions. Oxygen and nitrogen contents resulting from these processes determined. As an aid in interpreting results, upset tests were carried out on top and bottom portions of the experimental ingots. Diagrams, tables, micrographs. (C25, Ni, Cr)

61-C. Hydrogen Deoxidation of Vacuum-Melted High-Temperature Alloys. R. L. Hadley and L. M. Bianchi. Paper from "Vacuum Metallurgy". Electrochemical Society, Inc., p. 106-121.

Equipment and method by which an impinging stream of dry hydrogen on a molten metal surface reduces the oxygen content of iron, nickel and cobalt to below 0.005% at 1570° C. Deoxidation process is relatively insensitive to pressure, flow rate, time after approximately 10 min. and atomization of hydrogen. Table, graphs, diagrams, photographs. 7 ref. (C25, Fe, Ni, Cr, Co)

62-C. The Application of Vacuum Technology to Metallurgical Processes. Robert G. Ulrech. Paper from "Vacuum Metallurgy". Electrochemical Society, Inc., p. 122-127.

Application of vacuum techniques to annealing, sintering, soldering, brazing, outgassing, purification, refining, distillation, melting and casting. Describes 1000-lb. melting and casting unit designed for semi-continuous operation. Diagrams, photograph. (C25, J general, K7, K8)

63-C. Solid-State Purification of Molybdenum by Induction Heating. F. C. Todd, J. E. Drennan and W. W. Kleinschmidt. Paper from "Vacuum Metallurgy". Electrochemical Society, Inc., p. 142-146.

Use of "degassed" electrodes for VR-tubes reduces conditioning time. The molybdenum electrodes may be degassed by this technique which heats the electrodes for a minimum of 6 hr. at 190° C. and at a pressure of 5×10^{-5} mm. of mercury or less. Micrographs, graph, diagram. 5 ref. (C25, Mo)

64-C. Vacuum Degassing of Titanium. C. B. Griffith and M. W. Mallett. Paper from "Vacuum Metallurgy". Electrochemical Society, Inc., p. 147-154.

Considering the rapidity of degassing and minimum residual hydrogen content for a given pressure, the optimum degassing temperature for RC-55 titanium was 815° C. At lower temperatures, the rate is slower and solubility limit higher. Time required to degas titanium varies roughly as the square of the specimen diameter. Tables, diagram, graphs, photograph. 4 ref. (C25, Ti)

65-C. Experiments on Vacuum Distillation of Nonferrous Metals and Alloys. Max J. Spendlove. Paper from "Vacuum Metallurgy". Electrochemical Society, Inc., p. 192-213.

Mechanism of evaporation, experiments on vacuum distillation of zinc, vacuum distillation of vocatile methods from lead and tin. Principal

drawbacks are: operations must be on a batch basis; transfer of heat into a vacuum system on a practical scale is difficult; selection of construction materials is limited. Diagrams, tables, graphs, photographs. 11 ref.
(C25, C22, Zn, Pb, Sn, Mg, Cd, Te)

66-C. (German.) Manufacture, Properties, and Applications of High-Purity Aluminum. *VDI Zeitschrift*, v. 97, no. 35, Dec. 11, 1955, p. 1281-1283.

Method of electrorefining 99.99+ % pure aluminum for coating and plating purposes as an anticorrosive material. Tables, graph, diagram. 4 ref. (C23, L17, Al)

67-C. (Russian.) Mechanism of Reduction of Magnesium Oxide by Carbon. B. S. Gulianitskii and D. M. Chizhikov. *Izvestiia akademii nauk SSSR, otdelenie tekhnicheskikh nauk,* 1955, no. 11, Nov., p. 13-24.

Relation of reduction rate to pressure of carbon monoxide; volatility of magnesium oxide in vacuum and in argon atmosphere; effect of temperature on reaction speed in CO and in vacuum. Graphs. 30 ref.
(C general, Mg)

68-C. Electrodeposition of Beryllium, Thorium and Zirconium From Fused-Salt Baths. J. A. Gurklis, J. G. Beach and C. L. Faust. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* BMI-781, Nov. 1952, 20 p.

Flakes of beryllium were produced by electrolysis of $BeCl_2$ + KCl-LiCl baths, and purity compares favorably with that of vacuum distilled; dendritic thorium and zirconium were produced by electrolysis of $ThCl_4$ + KCl-LiCl baths and ZrF_4 + KCl-LiCl baths, respectively. Powdered zirconium was obtained from $ZrCl_4$ + KCl-LiCl bath. Tables, photographs. (C23, Be, Th, Zr)

69-C. The Melting of Small Pieces of Uranium Metal. W. R. DeHollander. *Hanford Atomic Products Operation (U. S. Atomic Energy Commission),* HW-38912, Sept. 1955, 8 p.

Small pieces, such as turnings, are melted in a magnesium oxide crucible in the presence of barium chloride and metallic calcium and in an inert atmosphere of argon. Method is appropriate for recovery and consolidation of metal with a high accountability value, such as uranium isotope 235. (C21, U)

70-C. Why Is the Big Money Behind Vacuum Metals? P. M. Unterweiser. *Iron Age,* v. 177, Jan. 26, 1950, p. 67-72.

Up-to-date information on and an evaluation of vacuum metallurgy. List of firms actively engaged in the process. Photographs. (C25, D8)

71-C. The Extraction of Zirconium (IV) By Tributyl Phosphate. E. W. Murbach and W. H. McVey. *Livermore Research Laboratory (U. S. Atomic Energy Commission),* LRL-115, Apr. 1954, 14 p.

The distribution of zirconium 95 tracer between 30% tributyl phosphate in carbon tetrachloride and varying concentrations of nitric acid were measured and the extraction equilibria of zirconium in tributyl phosphate solution studied. The equilibrium constant for the formation of the complex is 5×10^{-3}. Graphs, tables. 6 ref.
(C general, Zr)

72-C. A Metallurgical Evaluation of Refractory Compounds for Containing Molten Titanium. I. Oxides. II. Carbon, Graphite, and Carbides. III. Borides and Sulfides. E. J. Chapin and W. H. Friske. *Naval Research Laboratory, NRL Report* 4447, Nov. 1954, 39 p.; 4467, Dec. 1954, 22 p.; 4478, Jan. 1955, 31 p.

All oxides investigated were attacked in varying degrees of severity by molten titanium. The carbides tested are not suitable crucible materials and the diborides of titanium, zirconium and chromium are not promising. Further investigation is necessary on CeS. Graphs, photographs, tables. 66 ref.
(C21, Ti)

73-C. An Investigation of the Hydrogen Glow Discharge as a Means of Reducing Metal Halides. C. I. Whitman and R. B. Holden. *Sylvania Electric Products Incorporated (U. S. Atomic Energy Commission),* SEP-123, Sept. 1953, 28 p.

Reactions and operating procedures. Possibility of recycling unreacted material. Diagrams, photographs, table. (C4, Be, Th, U, Zr)

74-C. (English.) The Preparation and Properties of Pure Metals. J. C. Chaston. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 21, no. 12, Dec. 1955, p. 411-414.

Survey of methods of purification. Effects of impurities on properties. Tables. (C general)

75-C. (German.) Titanium Sponge: Melting Methods and Properties. Ulrich Zwicker. *Zeitschrift für Metallkunde,* v. 46, no. 12, Dec. 1955, p. 842-846.

Equipment and procedures for melting. Effects of gaseous impurities on properties. Graphs, photographs, micrographs. 6 ref.
(C21, Q general, Ti)

76-C. (German.) **Continuous Casting of Zinc Ingots.** Heinrich Josef Baggeler and Bernhard Trautmann. *Zeitschrift für Metallkunde,* v. 46, no. 12, Dec. 1955, p. 849-854.

Equipment and methods, construction of casting conveyer, capacity data. Photographs, diagram. 1 ref. (C5, Zn)

77-C. (Book.) **Carbon Technology Related to Aluminum Production.** S. W. Martin and H. W. Nelson. 50 p. Great Lakes Carbon Corp., Research and Development Department, Morton Grove, Ill.

Principles and practice in electrolytic reduction of alumina. Manufacture and properties of carbon anodes. Diagrams, micrograph, photographs, tables. 57 ref. (C23, Al)

78-C. The Electrochemistry of Aluminum Production. E. A. Hollingshead and N. W. F. Phillips. *Chemistry in Canada,* v. 8, Jan. 1956, p. 37-40.

Constitution and physical properties of the electrolyte, reactions occurring at the electrodes. Graphs, tables, photograph, diagram. 18 ref. (C23, Al)

79-C. Molten Cyanide Process of Purifying Germanium From Copper Contamination. Pei Wang. *Journal of Physical Chemistry,* v. 60, Jan. 1956, p. 45-47.

Treatment with molten alkali cyanide at elevated temperatures will remove copper contamination, with no thermal conversion or resistivity change evident in the germanium. Tables. 14 ref. (C24, Cu, Ge)

80-C. Principles of Vacuum Distillation of Metal Mixtures. J. E. Vivian. *Livermore Research Laboratory (U. S. Atomic Energy Commission),* LRL-88, Mar. 1954, 30 p.

Critical review of principles as applied to the separation of mixtures of metal. Limitations of the usual simplified equilibrium and rate relations for the batch process; relations of more general applications. Diagrams, graphs, table. (C22)

81-C. The Electrolytic Migration of Uranium From Acid Leach Liquors by Means of Ion Exchange Membranes. Norman W. Frisch. *Rohm and Haas Company Research Laboratories (U. S. Atomic Energy Commission),* RMO-2526, Aug. 3, 1953, 10 p.

Studies were conducted in a three-compartment cell, using anion permeable membranes; effect of certain operational variables on the economics of uranium recovery were noted. Diagrams, graphs, table. (C23, U)

82-C. Electrolytic Recovery of Manganese From Barren Leach Liquors. Paul F. Kirk. *Rohm and Haas Company Research Laboratories (U. S. Atomic Energy Commission),* RMO-2508, Aug. 22, 1952, 9 p.

The method, employing permselective, ion exchange membranes, gives a high-grade manganese product at excellent recovery levels. Diagram, tables. (C23, Mn)

83-C. Further Studies on the Recovery of Uranium From Sulfuric Acid Leach Solutions by Anion Exchange Resins. Al Preuss, Charles Dickert and Jean Saunders. *Rohm and Haas Company Research Laboratories (U. S. Atomic Energy Commission),* RMO-2527, Dec. 1953, 25 p.

Deals with a screening of resins employing tertiary, mixed tertiary-quaternary, and quaternary groupings incorporated into the resin structure. Graphs, tables. (C23, U)

84-C. (French.) **Aluminum in Australia.** G. A. Baudart. *Revue de l'aluminium,* v. 32, no. 226, Nov. 1955, p. 999-1001.

Facilities of the Bell Boy (Tasmania) reduction plant of 13,000 tons per year capacity. Maps. (C23, Al)

85-C. The Melting of Reactive Metals. J. Ian Nish. *Australasian Engineer,* 1955, Dec., p. 68-73.

Difficulties involved, methods used, or proposed for use. Diagrams, photographs. 25 ref. (C21)

86-C. Effect of Zone-Refining Variables on the Segregation of Impurities in Indium-Antimonide. T. C. Harman. *Electrochemical Society, Journal,* v. 103, Feb. 1956, p. 128-132.

Problems involved in preparation of high-purity indium antimonide. Electrorefining effectively removes zinc from indium; zone-refining effectively removes tellurium. Graphs. 3 ref. (C5, C23, In, Sb, Te, Zn)

87-C. Chemical Processing of Irradiated Fuel From Nuclear Power Reactors. F. Roberts. *Industrial Chemist and Chemical Manufacturer,* v. 32, Jan. 1956, p. 15-23.

Part played in nuclear power program by the chemical separation plants. The merits of various processing schemes, both present and contemplated, discussed in detail. Photographs, diagrams, tables, graph. 41 ref. (C general, U)

88-C. Pyroprocessing for Nuclear Fuels. Robert C. Reid, Dick Duffey and J. Edward Vivian. *Nucleonics,* v. 14, Feb. 1956, p. 22-25.

Engineering problems envisioned for pyroprocessing. Example of such a separation system described. Diagram. 16 ref. (C21, U)

89-C. (Czech.) **Reduction Melting of Tin Concentrates.** Ferdinand Kadlec. *Hutnické listy,* v. 10, no. 12, Dec. 1955, p. 706-709.

A concentrate of 56% tin, 10% iron was smelted with charcoal. Optimum charcoal additions, chimney and slag losses determined. Tables, graph. 2 ref. (C21, Sn)

90-C. (French.) **Electric Arc Melting of Molybdenum Alloys Under Vacuum.** M. P. Gousseland. *Métaux, corrosion-industries,* v. 30, no. 363, Nov. 1955, p. 415-425.

Melting and working of molybdenum alloys, physical properties of molybdenum and the 0.5% titanium molybdenum alloy, high-temperature properties, protection against oxidation. Photographs, tables, graphs. (C23, P general, Q general, Mo, Ti)

91-C. (German.) **Smelting and Casting of Titanium.** Werner Scheibe. *Giesserei,* v. 43, no. 1, Jan. 5, 1956, p. 8-17.

Historical development of titanium smelting, mechanical and physical properties of titanium, production of titanium sponge by Kroll method, contemporary distilling and smelting processes. Tables, graphs, diagrams, photographs. 280 ref. (C general, P general, Q general, Ti)

92-C. (German.) **Induction Smelting.** Karl-Heinz Brokmeier. *Giesserei,* v. 43, no. 3, Feb. 2, 1956, p. 57-64.

Electrical fundamentals and their significance for the selection of furnace type. Application of induction furnaces for treatment of different metals. Photographs, diagrams, graphs, table. (C21)

93-C. (Italian.) **Low-Frequency Induction Furnaces in the Electrification of the Foundry.** P. I. Elio Calamari. *Fonderia,* v. 250, no. 12, Dec. 1955, p. 557-566.

Description of modern induction furnaces, advantages of electricity, use of large-capacity furnaces for the production of bronze, brass, copper and aluminum. Diagrams, photographs, tables. 12 ref. (C21, Al, Cu)

94-C. Complex Metallurgy by Cerro de Pasco. I. L. Barker. *American Institute of Mining Metallurgical and Petroleum Engineers, Preprint,* 1956, Feb., 12 p.

Summary of a Peruvian metallurgical company's operations, with emphasis on smelting and refining. Photographs, tables. 6 ref. (C21, Pb, Cu, Zn, Bi, Ag, Au)

95-C. Increasing the Capacity of a Small Copper Smelter. Edward J. Caldwell. *American Institute of Mining Metallurgical and Petroleum Engineers, Preprint,* 1956, Feb., 11 p.

Detailed account of smelting plant's development since 1924. Diagrams, table. (C21, Cu)

96-C. Some Notes on Oroya Copper Slags. I. L. Barker, J. S. Jacobi and B. H. Wadia. *American Institute of Mining Metallurgical and Petroleum Engineers, Preprint,* 1956, Feb., 13 p. + 12 plates.

Preliminary report covering investigations into copper slag composition and losses. Micrographs, graphs, tables. 4 ref. (C21, Cu)

97-C. Survey of Mechanical Charging Practices of Horizontal Retort Zinc Smelters. J. Wesley Burgess. *American Institute of Mining Metallurgical and Petroleum Engineers, Preprint,* 1956, Feb., 15 p.

Four different types of charging machines described. (C21, Zn)

98-C. Some Theoretical Factors in the Zone Melting Process. Richard J. Dunworth. *Argonne National Laboratory (U. S. Atomic Energy Commission).* ANL-5360, Feb. 1956, 38 p.

Purification of an alloy by zone melting depends on the difference in solute concentration between the liquid phase and the solid phase, the diffusion rates of the solute in the solid and liquid phases, the degree of thermal or magnetic stirring in the liquid zone, the irregularity of the solidifying interface and a concentration gradient in the liquid near the interface. Tables, diagrams, graphs. 43 ref. (C5)

99-C. The Mufulira Electrolytic Copper Refinery. G. E. Rowe, G. N. Healey, P. C. Lockyer and A. A. Haynes. *American Institute of Mining Metallurgical and Petroleum Engineers, Preprint,* 1956, Feb., 28 p.

Anode production in the smelter. Design, equipment and operating techniques of the refinery tankhouse. Tables, (C21, C23, Cu)

100-C. Extractive Metallurgy. A. W. Schlechten. *Engineering and Mining Journal,* v. 157, Feb. 1956, p. 137-140.

Review and forecast of progress in extraction of nonferrous metals. Diagram, photograph. (C general, Ti, Zr, Pb, U, Zn, Ni, Al, Cu, Ge)

101-C. Reduction of Tungsten Oxides With Hydrogen. Joel O. Hougen, Robert R. Reeves and Gene G. Mannella. *Industrial and Engineering Chemistry,* v. 48, Feb. 1956, p. 318-320.

Effect of pellet size, flow rate and temperature on the rate of reduction of finely divided tungsten trioxide and tungsten dioxide in pelletized form with hydrogen from

500 to 800° C. Tables, graphs. 4 ref. (C2, W)

102-C. Floating Zone Melting of Solids by Electron Bombardment. M. Davis, A. Calverley and R. F. Lever. *Journal of Applied Physics,* v. 27, Feb. 1956, p. 195-196.

Electron bombardment is a means of obtaining stable floating zones. This step offers advantages in simplicity of operation and also permits the method to be easily extended to many refractory materials. Diagram, photograph. 5 ref. (C5, N12)

103-C. The Mufulira Electrolytic Copper Refinery. R. H. Bauld, G. E. Rowe, G. N. Healey, A. A. Haynes and P. C. Lockyer. *Journal of Metals,* v. 8, Feb. 1956, p. 234-256.

Design, construction and operation of the anode department and of the refinery tankhouse. Diagrams, photographs, tables. (C23, Cu)

104-C. Preparation of Metallic Titanium by Film Boiling. A. W. Petersen and L. A. Bromley. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Feb. 1956, p. 284-286.

Titanium, of 99.9% purity, was produced by film boiling titanium-iodide liquid on a heated filament. Diagrams, photographs. 16 ref. (C4, Ti)

105-C. (French.) **Zirconium, a Nuclear Material.** Thien-Chi Nguyen. *Vide,* v. 10, no. 60, Nov.-Dec. 1955, p. 152-164.

Special method of preparing ductile, high-purity zirconium, by the dissociation of ZrI_4 in contact with an incandescent wire, in a previously evacuated container. Tables, diagrams, photographs, graph. (C4, Zr)

106-C. (German.) **Effect of Antimony on Oxidation of Liquid Lead.** Erich Pelzel. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 9, no. 1, Jan. 1956, p. 17-25.

Effect of 0.5 to 5.0 grams of antimony per ton of lead on formation of oxide on the surface of molten metal in the ladle. Graphs, diagrams, tables, micrograph. 20 ref. (C5, Pb, Sb)

107-C. (Polish.) **Technology of Production of Metallic Lithium Under Reduced Pressure.** T. Szarowicz and M. Orman. *Prace Instytutow Ministerstwa Hutnictwa,* v. 7, nos. 5-6, Dec. 1955, p. 270-275.

The aluminothermic reduction is applied to lithium, with an efficiency of 89%. Vacuum techniques also explored. Tables, graphs, diagrams, photographs. 13 ref. (C26, C25, Li)

108-C. Fusion Electrolysis of Bismuth Trichloride. Paul M. Gruzensky. *Electrochemical Society, Journal,* v. 103, Mar. 1956, p. 171-173.

Bismuth was deposited from a fused electrolyte containing 33 wt. % bismuth trichloride in a lithium chloride-potassium chloride eutectic mixture as carrier salt at approximately 400° C. The electrolyte was maintained at desired temperature by electrolyzing current. Cathode current efficiency was nearly 100% and average yield was 88.8%. Diagram, graph, table. 9 ref. (C23, Bi)

109-C. Polarization in an Aluminum Reduction Cell. Warren E. Haupin. *Electrochemical Society, Journal,* v. 103, Mar. 1956, p. 174-178.

New method combines technique of current reversal with use of an a.c. bridge for determining polarization in an aluminum reduction cell. Polarization was found to be composed of two parts; one part had a very short time constant and the other a very long time constant. Diagrams, graphs. 8 ref. (C23, Al)

110-C. Effect of the Walls of Electrolytic Cells on Current Distribution. Fumio Hine, Shiro Yoshizawa and Shinzo Okada. *Electrochemical Society, Journal,* v. 103, Mar. 1956, p. 186-193.

The field in the rectangular cell with two parallel and flat plates as electrodes was analyzed. Consideration is not given to polarization phenomena for mathematical convenience. Diagrams, graphs. 11 ref. (C23)

111-C. Continuous Cast Bronze Shapes. G. D. Storm. *Materials & Methods,* v. 43, Feb. 1956, p. 108-110.

Continuous casting minimizes machining with resulting cost savings. Available alloys, properties, applications. Photographs, tables. (C5, Cu, Sn)

112-C. The Development of a Resin-in-Pulp Process and Its Applications to Ores of the White Canyon Area of Utah. R. F. Hollis, C. S. Abrams, C. K. McArthur and T. F. Izzo. *American Cyanamid Company, Raw Materials Development Laboratory (U. S. Atomic Energy Commission),* ACCO-42, June 1954, 23 p.

The development of a process and a machine for the recovery of uranium from acid slurries without accomplishing a liquid-solid separation. Diagrams, tables. (C general, U)

113-C. Examination of Poisoned Ion Exchange Resins From the Western Reefs Pilot Plant. R. H. Kennedy. *American Cyanamid Company, Raw Materials Development Laboratory, (U. S. Atomic Energy Commission),* ACCO-31, Feb. 1953, 10 p.

Tests were made to determine cause of the drop in uranium adsorption capacity of several samples of anion resins which had been used at the uranium pilot plant. Graph, tables. (C general, U)

114-C. A Pilot Plant Test of the Electrolytic Uranium Recovery Process. Galen W. Clevenger. *American Cyanamid Company, Raw Materials Development Laboratory (U. S. Atomic Energy Commission),* ACCO-40, June 1954, 36 p.

Results of a 1000-lb. per day test of a process for leaching uranium from ores with sodium carbonate, followed by simultaneous precipitation of uranium and regeneration of solutions by electrolytic means. Diagrams, graph, photographs, tables. 2 ref. (C23, U)

115-C. Determination of Alpha Activity of Uranium in Mud. C. A. Kienberger, R. E. Greene and C. E. Pepper. *Carbide and Carbon Chemicals Company, K-25 Plant (U. S. Atomic Energy Commission),* K-434, July 1949, 8 p.

Method employs solvent extraction, using diethyl ether and ammonium nitrate, for the recovery of uranium into a state sufficiently pure for electrodeposition and subsequent alpha counting. Table. 3 ref. (C28, U)

116-C. Separation of Hafnium From Zirconium by Extraction of Thiocyanate Complexes. II. Chemical Studies. L. G. Overholser, C. J. Barton and W. R. Grimes. *Carbide and Carbon Chemicals Corporation (U. S. Atomic Energy Commission),* Y-477, Sept. 1949, 35 p.

Partition of thiocyanic acid between hexone and aqueous phases of various compositions investigated. The extracted hafnium and zirconium may be almost quantitatively removed from the hexone phase by contact with sulfuric acid permitting recycle of the hexone phase at the expense of less than 1% of its contained thiocyanic acid. Graphs, tables. 1 ref. (C28, Hf, Zr)

117-C. Some Factors Influencing the Use of Tributyl Phosphate for the Extraction of Uranium in Analysis. T. W. Bartlett. *Carbide and Carbon Chemicals Company, K-25 Plant (U. S. Atomic Energy Commission),* K-706, Feb. 1951, 28 p.

Extraction from nitric acid solutions by tributyl phosphate was favored by the addition of sodium or ammonium nitrate, by high tributyl phosphate concentration in tributyl phosphate-hexane mixtures, and, in the absence of other nitrates, by increasing the nitric acid concentration. Graphs, tables. 15 ref. (C22, U)

118-C. Electrochemical Separations in Non-Aqueous Solutions. G. M. Pound, Gerhard Derge, June Fullmer, Earl Roland and Joan Pacacha. *Carnegie Institute of Technology, Metals Research Laboratory (U. S. Atomic Energy Commission),* AECD-3700, June, 1954, 42 p.

Electrolytic decomposition potentials of pure fission product metal chlorides in molten lithium chloride-potassium chloride eutectic were measured directly by current-voltage method as a function of temperature, and by a new back-method. It was concluded that certain electrolytic separations of fission product metals, based on difference in decomposition potential, are possible. Table, diagram, graphs. 5 ref. (C23)

119-C. New Chemical Process Wins Chrome From Ore. *Chemical Engineering,* v. 63, Apr. 1956, p. 308-311.

A new chemical-electrolytic process for making high-purity chromium metal from substandard domestic ores, at a rate of 2000 tons per year. Flowsheet, photographs. (C23, Cr)

120-C. Uranium Recovery Leached Zone Processes. Henry M. Heidt, Donald E. Tynan, J. B. Adams and Roger Bart. *International Minerals and Chemical Corporation (U. S. Atomic Energy Commission),* RMO-2041, Feb. 1955, 64 p.

Summarizes laboratory research and pilot plant development programs on the extraction and recovery of uranium from leached zone extracts. Diagrams, graphs, tables. (C general, B14, U)

121-C. Zr and Hf Production Tailored to Yield Three Products. W. W. Stephens and C. Q. Morrison. *Journal of Metals,* v. 8, Mar. 1956, p. 334-337.

Production process of commercial zirconium sponge, low-hafnium reactor grade zirconium sponge, and hafnium sponge from zirconium-hafnium ore. Diagram, photographs. 3 ref. (C general, Zr, Hf)

122-C. Debismuthizing of Lead. T. R. A. Davey. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Mar. 1956, p. 341-350.

Fundamental principles by which bismuth may be removed from lead by pyrometallurgical processes. Qualitative discussion of the phase diagrams followed by presentation of quantitative diagrams. Graphs, tables, diagrams. 30 ref. (C21, Bi, Pb)

123-C. Electrolytic Recovery of Uranium and Vanadium From Climax Leach Liquors. Paul F. Kirk. *Rohm and Haas Company Research Laboratories (U. S. Atomic Energy Commission)*, RMO-2512, Dec. 1952, 18 p.

Electrolytic recovery was found to proceed readily at an average cost of 32 kw.hr. per lb. U_3O_8 with average recovery efficiency of 99%. Diagrams, graph, photographs, tables. (C23, U, V)

124-C. Experimental Production of High-Purity Cobalt. K. K. Kershner, F. W. Hoertel and J. C. Stahl. *U. S. Bureau of Mines, Report of Investigations* 5175, Jan. 1956, 12 p.

Equipment and procedures for electrolytic process which produces cobalt metal with a purity of 99.99% with reference to metallic contaminations. Methods for analyzing purified products. Photographs, diagrams. 23 ref. (C23, Co)

125-C. Laboratory Recovery of Germanium and Cadmium in Sphalerite Concentrates. H. Kenworthy, A. G. Starliper and A. Ollar. *U. S. Bureau of Mines, Report of Investigations* 5190, Jan. 1956, 17 p.

Cadmium and germanium-bearing concentrates from Illinois-Kentucky fluorspar field were found to be amenable to an inert atmosphere fuming process for removing these metals in form of gaseous sulfides. Treating condensed fume by pyrometallurgical methods upgraded the material and provided a means of partly separating constituents. Vapor pressure studies were also conducted. Tables, graphs. 5 ref. (C22, C21, Ge, Cd)

126-C. A Qualitative Evaluation of Several Electrolytes for Electrorefining Bismuth. P. M. Gruzensky and W. J. Crawford. *U. S. Bureau of Mines, Report of Investigations* 5182, Jan. 1956, 32 p.

Most extensive work was done with basic tartrate, hydrochloric acid and hydrofluosilicic acid electrolytes, which produced smooth adherent deposits if low cathode current densities were used. Tables, photographs. 8 ref. (C23, Bi)

127-C. (German.) **Chemistry of Germanium. XXII. Preparation of Metallic Germanium in the Quenching-Tube.** Robert Schwarz and Egon Baronetzky. *Zeitschrift für anorganische und allgemeine Chemie*, v. 282, nos. 1-6, Dec. 1955, p. 280-285.

Starting with germanium tetrachloride, with germanium monochloride as the intermediate product, metallic germanium is produced. Purity of the product is determined by its conductivity. Graph, diagram. 5 ref. (C4, Ge)

128-C. (Polish.) **Metallic Germanium.** Jerzy Perlinski. *Przeglad techniczny*, v. 77, no. 1, Jan. 1956, p. 19-22.

Uses in semiconductors and transistors, raw materials for the production of germanium, obtaining and purification of germanium tetrachloride by chemical methods, methods of refining the metal by melting. Diagram, flowsheets. (C general, B general, T1, Ge)

129-C. (German.) **Pure Silicon.** H. Von Wartenberg. *Zeitschrift für Anorganische und allgemeine Chemie*, v. 283, no. 1-6, Jan. 1956, p. 372-376.

Purification of silicon and elimination of aluminum, zinc and other impurities. Diagram. 5 ref. (C general, Si)

130-C. Ion-Exchange Studies on Carbonate Leach Liquors From Grants, N. M., Ores. Charles S. Abrams. *American Cyanamid Company, Raw Materials Development Laboratory. (U. S. Atomic Energy Commission)*, ACCO-8, Oct. 1951, 20 p.

An investigation of the recovery of uranium from leach liquors by anion exchange resins; leach tests were run with carbonate and bicarbonate solution; over 99% recovery was made. Graphs, tables. (C general, B14, U)

131-C. Recovery of Uranium From Vitro Leach Liquors by Ion Exchange. I. The Effect of Molybdenum on Uranium Adsorption and Subsequent Cyclic Column Testing of Leach Liquor. Norman N. Schiff, Ernest T. Hollis and George W. Lower. *American Cyanamid Company, Raw Materials Development Laboratory (U. S. Atomic Energy Commission)*, ACCO-35, March, 1954, 28 p.

A three-column cyclic ion exchange test run on Vitro leach liquors indicates that uranium can be economically recovered from these liquors by means of an ion exchange column system. Graphs, tables. (C general, B14, U, Mo)

132-C. The Bisulphate Fusion Process for Copper Refinery Slimes Treatment. K. H. Koropp and E. J. Clugston, Jr. *American Institute of Mining*

Metallurgical and Petroleum Engineers, Preprint, 1956, Feb. 1956, 11 p.

Experimental work on slime treatment, current practice and equipment for fusion process in refinery. Diagrams, tables. 2 ref. (C21, Se, Te, Au, Ag, Cu)

133-C. Data Re Copper Converter Practice in Various Countries. Frank E. Lathe and Lisle Hodnett. *American Institute of Mining Metallurgical and Petroleum Engineers, Preprint,* 1956, Feb. 1956, 40 p.

Summary of information from 13 countries on converters and their operation, refractories practice, analysis of matte and slag, converter slag treatment and magnetic control. Tables, graphs. 12 ref. (C21, Cu)

134-C. Development of the Extraction Process for Uranium From South African Gold-Uranium Ores. A. M. Gaudin, R. Schuhmann, Jr., and John Dasher. *American Institute of Mining, Metallurgical and Petroleum Engineers, Preprint,* 1955, Nov. 1955, 35 p.

Steps involved in the process for gold and uranium recovery. Tables, micrograph, diagrams, graph. 12 ref. (C general, U, Au)

135-C. The Great Falls Billet Plant. Roy H. Miller. *American Institute of Mining Metallurgical and Petroleum Engineers, Preprint,* 1956, Feb., 7 p.

Construction and operation of a plant for producing, from cathode copper, 3-in. diam. high-phosphorus copper billets. (C5, Cu)

136-C. A Kinetic Study of the Hydrogen Reduction of Cobalt From Ammoniacal Cobalt Sulfate Solutions. Thomas M. Kaneko and Milton E. Wadsworth. *American Institute of Mining Metallurgical and Petroleum Engineers, Preprint,* 1956, Feb. 1956, 36 p.

Rate of reduction studied over a hydrogen partial pressure range of 150 to 800 psi. and a temperature range of 150 to 245° C. Graphs, diagram, table. 25 ref. (C2, Co)

137-C. Magnetite in the Hurley Smelter. H. W. Mossman. *American Institute of Mining Metallurgical and Petroleum Engineers, Preprint,* 1956, Feb. 1956, 36 p.

Investigation of conditions favoring magnetite formation and reduction in the converter and reverberatory furnace. Graphs, tables. 11 ref. (C21, Cu, Fe)

138-C. Recent Developments in Electrolytic Copper Refining at Canadian Copper Refiners Limited. Stuart S. Forbes. *American Institute of Mining Metallurgical and Petroleum Engineers, Preprint,* 1956, Feb. 1956, 14 p.

Buildings and operating procedures, some developments in addition agents, solution control and electrolyte heating. Tables. (C23, Cu)

139-C. Suspended Basic Roof on a Cold Charged Copper Anode Furnace. Guy Bridgstock. *American Institute of Mining Metallurgical and Petroleum Engineers, Preprint,* 1956, Feb., 11 p.

Summary of a copper refinery's experiences with a suspended basic roof. Data on life, maintenance, and costs. Tables. (C21, Cu)

140-C. Separation of Hafnium From Zirconium Using Tributyl Phosphate. R. P. Cox and G. H. Beyer. *Ames Laboratory (U. S. Atomic Energy Commission),* ISC-682, Dec. 1955, 14 p.

Feed solution for extraction step can be prepared from the reaction product of caustic and zircon sand. Diagrams, table. 7 ref. (C28, Hf, Zr)

141-C. The Separation of Protactinium and Zirconium by an Anion Exchange Column. A. G. Maddock and W. Pugh. *Journal of Inorganic and Nuclear Chemistry,* v. 2, Feb. 1956, p. 114-117.

Separation by anionic exchange on an Amberlite IRA-400 resin column was tested at macroscopic concentrations of the elements. Graphs. 9 ref. (C28, Pa, Zr)

142-C. (German.) **Aluminum Production Without Electrolysis of Fused Cryolite-Alumina.** H. Ginsberg. *Aluminium,* v. 32, no. 3, Mar. 1956, p. 145-146.

Ziegler process of depositing aluminum from complex organo-aluminum salts with a 7-to-10-fold increase in efficiency. 7 ref. (C23, Al)

143-C. (German.) **Induction and Resistance Smelting Furnaces.** Franz Deutz. *Elektrotechnische Zeitschrift,* v. 8, no. 2, Ausgabe B, Feb. 1956, p. 55-61.

Description of most frequently used induction and resistance furnaces of German origin. Diagrams, photographs. (C21, D5, D6)

144-C. The Extraction of Uranium From Sodium Nitrate Solutions With Dibutyl Carbitol. J. M. Googin and T. P. Sprague. *Carbide and Carbon Chemicals Corporation (U. S. Atomic Energy Commission),* Y-331, Jan. 1949, 17 p.

Extraction of uranyl nitrate fom sodium nitrate-nitric acid solutions with dibutyl carbitol gives a maxi-

mum distribution coefficient of about 17 (org./aq.). The value of 17 was obtained with 7.2 *N* sodium nitrate and 0.4 *N* nitric acid. Graphs, tables. (C general, U)

145-C. Separation of Hafnium From Zirconium by Extraction of Thiocyanate Complexes. L. G. Overholser, C. J. Barton and W. R. Grimes. *Carbide and Carbon Chemicals Corporation, (U. S. Atomic Energy Commission),* Y-431, June, 1949, 23 p.

Report on the progress to date of attempted separation of hafnium from zirconium by the difference in ether extractibility. Method shows considerable promise due to its rapid equilibrium time, its high separation factor, and the availability of the reagents involved. Graphs, tables. 1 ref. (C28, Hf, Zr)

146-C. Sodium-Aluminum Equilibria in Cryolite-Alumina Melts. Morris Feinleib and Bernard Porter. *Electrochemical Society, Journal,* v. 103, Apr. 1956, p. 231-236.

Studies at 940 to 1010° C. were undertaken to shed more light on the cathode reactions in the aluminum cell. Tables. 26 ref. (C23, Al)

147-C. Tantalum. Chester Placek and Donald F. Taylor. *Industrial and Engineering Chemistry,* v. 48, Apr. 1956, p. 686-695.

Step-by-step processing from hydroxide fusion of ore through leaching, hydrofluoric acid dissolution, crystallization, electrolysis, pressing of powder and sintering to the massive metal. Table, graph, photographs, flowsheet. 30 ref. (C23, Ta)

148-C. Refining of Platinum and Rhodium by an Ion Exchange Process. Charles K. Butler. *Industrial and Engineering Chemistry,* v. 48, Apr. 1956, p. 711-713.

Employs a cation exchange technique for the near-quantitative separation of base metal contaminants from anionic complexes of platinum and rhodium; adsorption of cations is dependent on the free acid in the influent. A platinum-rhodium alloy containing 4% base metals was refined to 99.98% precious metals. Diagram, photograph. 4 ref. (C general, Pt, Rh)

149-C. The Production of Uranium by the Reduction of UF_4 by Mg. F. H. Spedding, H. A. Wilhelm and W. H. Keller. *Iowa State College, Ames Laboratory (U. S. Atomic Energy Commission),* CT-2712, June 1945, 67 p.

Experimental procedures; production of UF_4; processing and specifications of UF_4, Mg and linear refractories; conditions of operation; properties of metal produced. Graphs, tables, diagram. 41 ref. (C4, U)

150-C. Vacuum-Melting Nickel-Base Alloys on a Production Scale. F. N. Darmara and J. S. Huntington. *Mechanical Engineering,* v. 78, Apr. 1956, p. 323-326.

Vacuum manufacture of Waspaloy to pass a 40 hr. creep test of 32,500 psi. at 1500° F. Table, graphs, photographs, diagram. (C25, Ni)

151-C. The Mains Frequency Coreless Induction Melting Furnaces. Considerations Affecting Design. *Metallurgia,* v. 53, no. 317, Mar. 1956, p. 99-102.

Design, characteristics and applications of large induction furnaces. Diagrams, photographs. (C21, D6)

152-C. The Extraction and Purification of Titanium. Graham Oldham. *Mining Journal,* v. 246, Mar. 30, 1956, p. 391-393.

Review of recent progress. Patented reduction processes discussed. Photographs. 19 ref. (C general, Ti)

153-C. Hafnium Metal. II. Reduction of Hafnium Tetrafluoride to Hafnium Metal. P. J. Hagelston, R. O. Hutchison and F. J. Lambert. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission),* Y-645, Aug. 30, 1950, 10 p.

Reduction process using calcium and iodine as the reductant and heat booster, respectively. Diagram, photographs, table. (C4, Hf)

154-C. The Separation and Collection of U-236 by the Electromagnetic Process. H. W. Savage and P. E. Wilkinson. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission),* Y-697, Nov. 1950, 136 p.

A 12-in. radius, high-recovery calutron was designed, tested, and used. Details of the experimental, design, calutron operations, chemistry, mass analysis and health physics programs. Tables, photographs, diagrams, graphs. 14 ref. (C general, U)

155-C. Recovery of Uranium by Ion Exchange Resins. Sallie Fisher and Frank McGarvey. *Rohm and Haas Company, Research Laboratories (U. S. Atomic Energy Commission),* RMO-2518, Mar. 1953, 34 p.

Selection of optimum-porosity resin; chemistry and hydraulics of resin operation; recovery of uranium in eluate. Diagram, tables, graphs. (C general, U)

156-C. Separation of Hafnium From Zirconium by Multiple Recrystallization of Ammonium Fluozirconates. Wallace W. Beaver. *U. S. Atomic Energy Commission, Research and Development Report,* BBC-54, Aug. 1950, 85 p.

A process for separating zirconium and hafnium by recrystallization of ammonium zirconium fluoride; projection of this process into a plant scale development in an attempt to produce 10,000 lb. of zirconium content as pure zirconium oxide. Tables, diagrams, graphs, photographs. (C28, Zr, Hf)

157-C. An Investigation of Methods for the Separation of Uranium Contained in Uranium Bearing Ore Concentrates From Western Colorado. G. C. Reid. *U. S. Atomic Energy Commission, Research and Development Report,* MCW-8, Apr. 1946, 16 p.

A process using carnotite concentrates was found to give clean separation and high recovery. Tables. (C general, B14, U)

158-C. Reduction of Uranyl Fluoride With Hydrogen. O. J. Buckheim, C. F. Ritchie, C. D. Harrington and C. W. Kuhlman. *U. S. Atomic Energy Commission, Research and Development Report,* MCW-175, Mar. 1949, 7 p.

Experimental process, reaction rate and reaction mechanism. Graph, tables. 4 ref. (C4, U)

159-C. Homogeneous Alloy Ingots Produced by Consumable-Electrode Arc Melting. R. A. Beall, F. Caputo and E. T. Hayes. *U. S. Bureau of Mines, Report of Investigations,* 5200, Mar. 1956, 12 p.

Various methods used to introduce alloying materials into the homogeneous zirconium-alloy ingot evaluated by the degree of homogeneity of resulting ingots, as determined in tests on sections cut from the ingots. Tables, photographs. 3 ref. (C21, Zn)

160-C. The Extraction Mechanism of Plutonium (IV) TTA Chelate in Sec-Butylbenzene-Nitric Acid-Uranyl Nitrate Mixtures. D. L. Heisig and T. E. Hicks. *University of California Radiation Laboratory (U. S. Atomic Energy Commission),* UCRL-1169, July 1952, 75 p.

Rate of extraction, both with and without uranyl nitrate, was found to be limited by the rate of transfer of plutonium across the organic-aqueous boundary layer. Graphs, tables. 21 ref. (C general, Pu)

161-C. Investigation of Equilibrium in the Reduction of Titanium Dioxide by Carbon at High Temperatures. I. V. S. Kutsev and B. F. Ormont. *Henry Brutcher Translation No.* 3642, 10 p. (From *Zhurnal Fiz. Khimii,* v. 29, no. 4, 1955, p. 597-601.) Henry Brutcher, Altadena, Calif.

Chemical and X-ray analysis; equilibrium by carbon monoxide pressure from 1600 to 2000° K.; stability of TiO1.7. Table. 14 ref. (C general, Ti)

162-C. Measurements of Velocity of Flow in Liquid Metal in Induction Furnaces. M. Riepe and H. Ilberg. *Henry Brutcher Translation No.* 3653, 12 p. (Abridged from *Forschung auf dem Gebiete des Ingenieurwesens,* v. 2, no. 11, 1931, p. 1-7.) Henry Brutcher, Altadena, Calif.

Investigates forces and pattern of metal flow in the melting channels of induction furnaces. Causes of circulation of liquid metal in channel. Graphs, diagrams. 2 ref. (C21, D6)

163-C. Production of Boron by Igneous Electrolysis. J. L. Andrieux and W. J. Deiss. *Henry Brutcher Translation No.* 3659, 8 p. (Abridged from *Bulletin de la Société Chimique de France,* no. 6, June 1955, p. 838-841.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 116-C, 1955. (C23, B)

164-C. Solvent Extraction of Zirconium With Tributyl Phosphate. Arnold E. Levitt and Harry Freund. *American Chemical Society, Journal,* v. 78, Apr. 20, 1956, p. 1545-1549.

Study of variables involved in extraction from hydrochloric acid solutions. Graphs, tables. 25 ref. (C general, Zr)

165-C. Solvent Extraction Problems Overcome. *Chemical Engineering,* v. 63, May 1956, p. 130-132.

Uranium is removed from wet-process phosphoric acid by solvent extraction, followed by precipitation. Extraction is by violent agitation of the phosphoric acid and solvent in tanks, followed by separation in centrifuges. Photographs, diagram. (C general, U)

166-C. Tantalum Process Operations Line-Up. *Chemical Week,* v. 78, Apr. 28, 1956, p. 62, 64, 66.

Use of liquid-liquid extraction to separate tantalum and columbium salts for electrolysis. (C general, Ta, Cb)

167-C. Continuous Casting of Non-Ferrous Strip. *Steel Processing,* v. 42, Apr. 1956, p. 212-213, 238.

Method is one of several which have been used with varying commercial success; it is particularly designed for strip rather than rounds or squares. Photographs. (C5)

168-C. Zirconium Purification, Using a Basic Sulfate Precipitation. R. H. Nielsen and R. L. Govro. *U. S. Bureau of Mines, Report of Investigations* 5214, Mar. 1956, 14 p.

Technical-grade sulfuric acid is used to precipitate a basic zirconium sulfate from a hot dilute hydrochloric acid solution. With close control of temperature, pH, and zirconium-sulfate ratio, excellent purification and complete zirconium recovery can be attained. Diagrams, graphs, tables. 17 ref.
(C general, Zr)

169-C. Experimental Electric Smelting of Manganese Ores. R. A. Campbell, G. E. Viens and R. R. Rogers. *Canadian Mining & Metallurgical Bulletin,* v. 49, no. 528, Apr. 1956, p. 274-280.

Electric smelting of five low-grade Canadian manganese ores investigated. In one case, results were considered to be sufficiently promising to justify the construction of a pilot plant. Graph, tables. (C21, Mn)

170-C. The Separation of Polonium From Bismuth by Distillation. R. W. Endebrock and P. M. Engle. *Monsanto Chemical Company, Mound Laboratory (U. S. Atomic Energy Commission),* AECD-4146, Aug. 1953, 43 p.

Experimental work on the separation of polonium from bismuth by distillation during the period from 1949 to 1952. Data showing operation of simple batch stills and of fractionating stills with and without helium sparging. The problem of materials of construction and data obtained while working on this phase of the project. Diagrams, graphs, tables. 24 ref. (C22, Bi, Po)

171-C. Production of Uranium Metal by the Hot Wire Technique. G. Derge, M. Fine, G. Monet, I. Rehn and A. Rodrigues. *University of Chicago, Metallurgical Laboratory (U. S. Atomic Energy Commission),* AECD-3697, Oct. 1944, 29 p.

Hydrogen and iodine were passed over crude uranium at 500° C. to form uranium tetra-iodide which decomposed on a thorium oxide coated tungsten filament operating at 1500° C. The pure uranium dripped into a crucible in the cooler part of the furnace. This produced spectroscopically pure metal and alternative designs were made to simplify operation and extend it to larger scales. Diagrams, graphs, micrographs, tables. 17 ref. (C4, U)

172-C. (French.) **The Ultimate Purification of Metals by Physical Methods.** F. Montariol. *Chimie & Industrie,* v. 75, no. 1, Jan. 1956, p. 57-64.

Principles of method for purifying metals by moving a molten area along a bar; calculations by means of which the distribution of impurities in an ingot after such a treatment may be predicted; various applications, technical problems involved and results obtained. Diagrams, graphs, photograph, table. 13 ref. (C5)

173-C. (German.) **Present State of Industrial Vacuum Smelting Process.** Otto Winkler. *Zeitschrift für Metallkunde,* v. 47, no. 3, Mar. 1956, p. 133-144.

Effects which may be achieved by vacuum treatment of melts. Present fields of application, methods and future trends. Diagrams, graphs, photographs. 23 ref. (C25, D8)

174-C. (German.) **Manganese Losses During Smelting of Nickel-Manganese Alloys Under Low Pressure.** Lore Schumann-Horn, Albrecht Mager and Walter Deisinger. *Zeitschrift für Metallkunde,* v. 47, no. 3, Mar. 1956, p. 145-148.

Studies during melting in a vacuum. The loss of manganese is exclusively due to evaporation, this process being subject to an exponential time law with a time constant which is independent from the manganese content but dependent on pressure and temperature. Tables, graphs. 6 ref. (C25, Ni, Mn)

175-C. (German.) **Titanium and Zirconium Smelting in Vacuum Electric Arc Furnace.** Helmut Gruber and Helmut Scheidig. *Zeitschrift für Metallkunde,* v. 47, no. 3, Mar. 1956, p. 149-160.

Experience with a furnace provided with bar feed for controlling a melting electrode (maximum weight of charge, 300 kgs.) Diagrams, photographs, graphs, tables. 33 ref. (C25, Ti, Zr)

176-C. (German.) **High Vacuum Arc Smelting of Molybdenum.** Richard Kieffer and Friedrich Benesovsky. *Zeitschrift für Metallkunde,* v. 47, no. 3, Mar. 1956, p. 160-164.

Design and operation of melting furnaces for production of ingots of substantial size. Tables, graphs, micrographs, diagrams, photograph. 19 ref. (C25, Mo)

177-C. (German.) **Stability of Vertical Smelting Zones.** W. Heywang. *Zeitschrift fur Naturforschung,* v. 11a, no. 3, Mar. 1956, p. 238-243.

Theoretical investigation, determination of smelting zone surface shape. Graphs, diagrams. 4 ref. (C21)

178-C. (Italian.) **Zinc Smelting Furnaces.** Turno De Michelis. *Fonderia,* v. 5, no. 3, Mar. 1956, p. 137 + 6 pages.

Smelting operations at the Montevecchio Co. in Italy. Diagrams. (C21, A5, Zn)

179-C. (Book.) **Bibliography on Extractive Metallurgy of Nickel and Cobalt.** R. E. Bauder. 621 p. 1956. Bureau of Mines, Washington, D. C.

Research report on utilization of Cuban lateritic ores and the chemistry of reactions of nickel and cobalt in field of extractive metallurgy. The period is from January 1929 to July 1955 and includes techniques and plant equipment for the recovery of nickel and cobalt. (C general, Ni, Co)

180-C. The Melting of High Purity Uranium. B. Blumenthal. *Argonne National Laboratory (U. S. Atomic Energy Commission),* ANL-5019, Nov. 1952, 56 p.

A melting process developed for the consolidation of high-purity electrolytic uranium crystals into sound ingots of high density without serious contamination. Tables, graphs, diagrams, photographs, micrographs. 19 ref. (C5, U)

181-C. The Separation of Zirconium and Hafnium. James F. Shea, D. W. Scott, H. W. Adam, A. E. Austin and C. M. Schwartz. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* BMI-JDS-202, June 1949, 36 p.

Petrographic, X-ray and analytical studies were made on synthetic and natural zirconium minerals to determine how hafnium occurs in zirconium ores, to evaluate the possibility of separating it by physical means, and to devise some simple method for classifying the hafnium content of zirconium ores. Tables. (C general, B14, Hf, Zr)

182-C. Production of Zirconium at Y-12. J. W. Ramsey and W. K. Whitson, Jr. *Carbide and Carbon Chemicals Company (U. S. Atomic Energy Commission),* Y-817, Oct. 1951, 41 p.

General description of zirconium plant includes materials of construction, principal equipment, construction drawings, operating conditions and costs information. Tables, photographs, diagrams. (C general, A5, Zr)

183-C. Preparation of Pure Nickel by Electrolysis of a Chloride Solution. W. A. Wesley. *Electrochemical Society, Journal,* v. 103, May 1956, p. 296-300.

Pure nickel was prepared in the form of malleable electrodeposited sheets as thick as 6 mm. from purified nickel chloride-boric acid solution using iridium-platinum alloy anodes. Tables. 10 ref. (C23, Ni)

184-C. Electrochemical Characteristics of Melts in the Sb-Sb_2S_3 System. Tsutomu Yanagase and Gerhard Derge. *Electrochemical Society, Journal,* v. 103, May 1956, p. 303-306.

Liquid antimony and antimony trisulfide were equilibrated at various temperatures and electrolyzed with the metal phase as anode and the sulfide phase as cathode. Current efficiencies varied below 60% and analysis of the data indicated that the balance of the current should be accounted for by the electronic character of the melt rather than losses or side reactions. Diagram, graphs, tables. 4 ref. (C23, Sb)

185-C. The Resin-in-Pulp Process for Recovery of Uranium. R. F. Hollis and C. K. McArthur. Paper from "Proceedings of the International Conference on the Peaceful Uses of Atomic Energy. v. VIII. Production Technology of the Materials Used for Nuclear Energy". United Nations. p. 54-63.

Chemistry, variables and development of process; operation of the pilot plant rip circuit; commercial design considerations. Diagrams, tables, graphs. (C general, B14, U)

186-C. An Ion Exchange Process for the Recovery of Uranium From Carbonate Leach Solutions. Jagdish Shankar, D. V. Bhatnagar and T. K. S. Murthy. Paper from "Proceedings of the International Conference on the Peaceful Uses of Atomic Energy. v. VIII. Production Technology of the Materials Used for Nuclear Energy". United Nations. p. 64-70.

Effluent from the process can be recycled for contacting fresh ore. In the adsorption stage, uranium is freed from impurities. Sodium nitrate used for elution serves as a salting-out agent in solvent extraction process and the raffinate, after adjusting the composition, can be used for a second elution. Tables, graphs, diagram. 5 ref. (C general, U)

187-C. Recovery of Uranium From Phosphates by Solvent Extraction. Ray S. Long, David A. Ellis and Richard H. Bailes. Paper from "Proceedings of the International Conference on the Peaceful Uses of Atomic Energy. v. VIII. Production Technology of the Materials Used for Nuclear Energy". United Nations. p. 77-80.

Processes for recovery from phosphoric acid and from normal superphosphate. Diagram, graph. (C general, U)

188-C. The Extraction of Thorium and Uranium From Monazite. P. Krumholz and F. Gottdenker. Paper

from "Proceedings of the International Conference on the Peaceful Uses of Atomic Energy. v. VIII. Production Technology of the Materials Used for Nuclear Energy". United Nations. p. 126-128.

A new process for the separation of thorium and uranium and for the production of technically pure thorium compounds from crude thorium hydroxide as obtained in the alkaline decomposition of bonazite. 10 ref. (C28, Th, U)

189-C. Uranium Metallurgy in Belgium. Paper from "Proceedings of the International Conference on the Peaceful Uses of Atomic Energy. v. VIII. Production Technology of the Materials Used for Nuclear Energy". United Nations. p. 156-161.

Description of processes to be used in new facility for the industrial production of natural uranium. (C general, U)

190-C. The Preparation of Uranium Metal by the Reduction of Uranium Tetrafluoride With Magnesium. H. A. Wilhelm. Paper from "Proceedings of the International Conference on the Peaceful Uses of Atomic Energy. v. VIII. Production Technology of the Materials Used for Nuclear Energy". United Nations. p. 162-174.

Experiments, studies and observations made in connection with the development and operation of a large-scale low-cost process for the production of high-purity uranium metal. Graphs, photographs, diagrams. (C26, U)

191-C. Fundamental Considerations in the Reduction Processes of Thorium and Uranium. B. Kopelman. Paper from "Proceedings of the International Conference on the Peaceful Uses of Atomic Energy. v. VIII. Production Technology of the Materials Used for Nuclear Energy". United Nations. p. 175-183.

Various methods useful for the production of thorium and uranium metal examined from the standpoint of ease of reduction, cost and purity of the product, as well as the type of product to be produced. Graphs, micrographs, tables. 9 ref. (C general, Th, U)

192-C. Zirconium Metal Production. S. M. Shelton, E. D. Dilling and J. H. McClain. Paper from "Proceedings of the International Conference on the Peaceful Uses of Atomic Energy. v. VIII. Production Technology of the Materials Used for Nuclear Energy". United Nations. p. 505-550.

Ores, production methods, properties and uses; details of the production of reactor-grade zirconium by the Bureau of Mines. Diagrams, photographs, graphs, tables. 66 ref. (C general, Hf, Zr)

193-C. Process for Separation of Zirconium and Hafnium. J. Hure and R. Saint-James. Paper from "Proceedings of the International Conference on the Peaceful Uses of Atomic Energy. v. VIII. Production Technology of the Materials Used for Nuclear Energy". United Nations. p. 551-553.

Countercurrent extraction using tributyl phosphate as a solvent. Graphs, diagram. 3 ref. (C general, Zr, Hf)

194-C. Separation of Hafnium From Zirconium by Vapour Phase Dechlorination. Brahm Prakash and C. V. Sundaram. Paper from "Proceedings of the International Conference on the Peaceful Uses of Atomic Energy. v. VIII. Production Technology of the Materials Used for Nuclear Energy". United Nations. p. 554-558.

Process consists of production of anhydrous zirconium chloride from zircon, purification of the chloride to free it from contaminants other than hafnium and vapor phase dechlorination for hafnium removal. Diagrams, table. 20 ref. (C4, Zr, Hf)

195-C. Separation of Hafnium From Zirconium and Production of Pure Zirconium Dioxide. N. P. Sajin and E. A. Pepelyaeva. Paper from "Proceedings of the International Conference on the Peaceful Uses of Atomic Energy. v. VIII. Production Technology of the Materials Used for Nuclear Energy". United Nations. p. 559.

Separation was accomplished through fractional crystallization of potassium fluozirconate. Table, photographs, graphs. 9 ref. (C28, Hf, Zr)

196-C. Methods of Separating Zirconium From Hafnium and Their Technological Implications. F. Hudswell and J. M. Hutcheon. Paper from "Proceedings of the International Conference on the Peaceful Uses of Atomic Energy. v. VIII. Production Technology of the Materials Used for Nuclear Energy". United Nations. p. 563-571.

Some processes studied in Great Britain, their relation to the general background of the extractive metallurgy of zirconium and their technological significance. Table, graphs, photograph, diagrams. 13 ref. (C general, Zr, Hf)

197-C. (French.) Extraction of Metallic Gallium From Hungarian Bauxite.

E. Papp, A. Héjja and J. Oveges. *Acta Technica Academiae Scientiarium Hungaricae,* v. 14, nos. 1-2, 1956, p. 55-78.

Available data show that metallic gallium cannot be extracted economically if no changes are made in the conventional process, but probably the process of precipitation of alumina hydrate by the carbon dioxide method will be suitable for the production of plain metallic gallium. Tables, diagrams, photograph. 44 ref. (C general, Ga, Al)

198-C. Separation of the Lanthanons at Amalgam Cathodes. II. The Separation of Samarium From Gadolinium and Purifications of Europium at a Lithium Amalgam Cathode. E. I. Onstott. *American Chemical Society, Journal,* v. 78, May 20, 1956, p. 2070-2076.

The amalgam cathode separation of the lanthanons appears to offer unusual promise for rapid enrichment of specific lanthanons. Separation can be accomplished in solutions of citrate complexes or in acid solutions. Graphs, tables. 14 ref. (C28, Sm, Gd, Eu)

199-C. Precipitation of Metal From Salt Solution by Reduction With Hydrogen. F. A. Schaufelberger. *Mining Engineering,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 8, May 1956, p. 539-548.

Review of pertinent literature, mechanisms of metal precipitation, nucleation, growth and agglomeration, solubility phenomena of gases and solids at elevated temperatures. Micrographs, tables, graphs. 34 ref. (C2, Cu, Ni, Co, Cd)

200-C. Production of Boron by Igneous Electrolysis. J. L. Andieux and W. J. Deiss. *Henry Brutcher Translation No.* 3659, 8 p. (Abridged from *Bulletin de la Société Chimique de France,* no. 6, June 1955, p. 838-841.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 116-C, 1955. (C23, B)

201-C. Influence of Low-Frequency Vibrations of the Mold Upon Ingot Crystallization. V. I. Leont'ev. *Henry Brutcher Translation No.* 3716, 7 p. (From "Problems of Metallography and Metal Physics" 4th Collection of Papers. State Scientific and Technical Publishing House for Ferrous and NF Literature under Ministry for Ferrous Metallurgy, Moscow, 1955, p. 70-76.) Henry Brutcher, Altadena, Calif.

Investigation of influence of vibration velocity and acceleration of ingot mold upon structure of ingot. Beneficiation of ingots by jolting. Photographs. 4 ref. (C5, D9, N12, Zn, ST)

202-C. (Hungarian.) **Casting Problems With Aluminum-Copper-Magnesium Alloy.** Lajos Almashegi. *Kohaszati Lapok,* v. 11, no. 3, Mar. 1956, p. 129-131.

The cracking of cast ingots, its causes and prevention, based on industrial experience. Graphs, diagram. (C5, Al, Cu, Mg)

203-C. (Portuguese.) **Effect of Agitation on the Speed of Elimination of the Zinc Dissolved in Lead, by Reaction With PbO.** Tharcisio D. de Souza Santos. *ABM(Boletim da Associacao Brasileira de Metais.* v. 12, no. 2, Jan. 1956, p. 27-40; disc., p. 40-41.

Dezincification process, developed in 1942, is based on oxidation by PbO and direct oxidation by an air blast. Effect on reaction kinetics by mechanical agitators. Graphs, diagrams. 3 ref. (C28, Zn, Pb)

204-C. (Portuguese.) **Practical Process Control of the Dezincification of Lead by Means of "Solidification Tests".** Tharcisio D. de Souza Santos. *ABM(Boletim da Associacao Brasileira de Metais,* v. 12, no. 2, Jan. 1956, p. 43-52; disc., p. 53.

The dezincing operation, which comes after desilvering, may be followed at every stage by checking on shape and size of crystals and the presence of films on the surface of a specimen obtained by slow cooling of the liquid bath. Micrograph, photographs, graph. 5 ref. (C28, Zn, Pb)

205-C. (Portuguese.) **Dezincification of Desilvered Lead by the Process Employed at the Technological Research Institute.** Tharcisio D. de Souza Santos. *ABM(Boletim da Associacao Brasileira de Metais,* v. 12, no. 2, Jan. 1956, p. 55-62; disc., p. 63-64.

Eliminating the zinc by reactions with lead oxide and the oxygen of an air blast in cast iron ladles, at 640 to 660° C. Extreme purity of lead after about 4 hr. of this treatment. Economy and high yield. Table. 9 ref. (C28, Zn, Pb)

206-C. The Electrolytic Zinc Plant of the Hudson Bay Mining & Smelting Company, Limited. E. Austin and W. E. McFadden. *Canadian Mining and Metallurgical Bulletin,* v. 49, no. 529, May 1956, p. 344-359.

Roasting, leaching, electrolysis and casting facilities. Photographs, diagrams, tables. (C23, C5, B14, B15, Zn)

207-C. Pyrochemical Separation Methods: I. The Distribution of Plutonium and Long-Lived Fission Products Between Molten Irradiated Uranium Fuel and Fused Inorganic Fluorides. Archie G. Buyers. *North American Aviation, Inc. (U. S. Atomic Energy Commission),* NAA-SR-1157, Mar. 1955, 32 p.

Data from equilibration at 1300° C. with various salt scrubs have established the effectiveness of plutonium extraction by uranium tetrafluoride. Photographs, tables, graphs. 9 ref. (C4, U, Pu)

208-C. (French.) **The Development of Metallurgy at Katanga.** Charles Piedboeuf. *Revue Universelle des Mines,* v. 12, no. 9, May 1956, p. 133-144.

Development of extractive nonferrous metallurgy at the Katanga Steelworks. Production of copper and cobalt by electrolysis and zinc and uranium by hydrometallurgical processes. Diagrams, graph. (C general, Co, Cu, Zn, U)

209-C. (French.) **Contribution to the Study of the Composition of Copper Mattes.** Jean-Jacques Comhaire. *Revue Universelle des Mines,* v. 12, no. 9, May, 1956, p. 145-153.

Chemical analysis, microscopy and radio-crystallography indicate the presence of galena which enters into the formation of a eutectic, whose second element is formed by the association of copper sulfide and bornite. After liquidation, the presence of carrollite and seligmannite is also indicated. Tables, diagrams, micrographs, radiogram. 20 ref. (C21, Cu)

210-C. (Russian.) **Effects of Amperage and Current Density on Yield From Cryolite-Alumina Electrolytic Baths.** L. N. Antipin and I. Niderkorn. *Zhurnal Prikladnoi Khimii,* v. 29, no. 4, Apr. 1956, p. 577-583.

Hall process in production of aluminum. Yield versus current and current density curves reveal maximums and minimums explained by the release of sodium. Graphs, table, diagram. 8 ref. (C23, Al)

211-C. (Book.) **Proceedings of the International Conference on the Peaceful Uses of Atomic Energy, v. VIII. Production Technology of the Materials Used for Nuclear Energy.** 627 p. 1956. United Nations, New York. $10.00.

Details of chemical and metallurgical processes for such materials as uranium, thorium, beryllium, zirconium and heavy water. Pertinent papers separately abstracted. (C general, Th, U, Zr, Be)

212-C. The Distribution of Plutonium in the Systems Uranium-Silver and Uranium-Silver-Gold. D. E. McKenzie. *Canadian Journal of Chemistry,* v. 34, June 1956, p. 749-756.

Theoretical background for selection of silver as an extractant for plutonium from neutron-irradiated uranium. Graphs, tables, diagram. 7 ref. (C general, Au, Ag, U, Pu)

213-C. Solving the Practical Problems of Titanium Production. M. G. Mastin. *Engineering and Mining Journal,* v. 157, June 1956, p. 78-87.

Production processes, costs, purification of sponge, future possibilities. Photographs, graph, diagrams. (C4, B14, Ti)

214-C. Electrorefining for Removing Fission Products From Uranium Fuels. Leonard W. Niedrach and Arthur C. Glamm. *Industrial and Engineering Chemistry,* v. 48, June 1956, p. 977-981.

General feasibility of an electrorefining process for uranium has been demonstrated both with regard to operability and ability to give decontamination. Tables, diagram, graphs. 19 ref. (C23, U)

215-C. Experiments on the Semi-Continuous Casting of Bronze. E. C. Ellwood, J. C. Prytherch and E. F. Phelps. *Institute of Metals, Journal,* v. 84, May 1956, p. 319-326 + 2 plates.

Design and construction of a machine (using unlubricated graphite dies) for casting rods and tubes of small dimensions. Casting process and properties of the product. Diagrams, graph, tables, photographs. 8 ref. (C5, Cu)

216-C. Production of Uranium Metal. D. S. Arnold, C. E. Polson and E. S. Noe. *Journal of Metals,* v. 8, May 1956, p. 637-639.

An intricate series of process steps are required to produce uranium reactor fuel elements to meet the exacting product demands. Photograph, diagrams. (C general, U)

217-C. Separation of Germanium and Cadmium From Zinc Concentrates by Fuming. H. Kenworthy, A. G. Starliper and A. Ollar. *Journal of Metals,* v. 8, May 1956, p. 682-685.

Germanium and cadmium may be removed effectively by heating certain sphalerite concentrates in an inert atmosphere. Tables, graphs. 6 ref. (C28, Zn, Cd, Ge)

218-C. Purification of $GeCl_4$ by Extraction With HCl and Chlorine. H. C. Theuerer. *Journal of Metals,* v. 8, May 1956, p. 688-690.

Method is simple and readily

adaptable to the quantity production of germanium dioxide, either from primary crude oxide or from germanium scrap material. Diagram, graphs, table. 10 ref. (C4, Ge)

219-C. Purification of Gram Amounts of Americium. J. S. Coleman. *Los Alamos Scientific Laboratory (U. S. Atomic Energy Commission),* LA-1975, Nov. 1955, 39 p.

Ion exchange, solvent extraction and precipitation methods; details of two ion-exchanger processes for the separation of americium from rare earths. Diagrams, photograph, tables, graphs. 20 ref. (C general, Am)

220-C. The First Commercial Plant for Electrowinning of Chromium. M. C. Carosella and J. D. Mettler. *Metal Progress,* v. 69, June 1956, p. 51-56.

High-purity chromium is produced from high-carbon ferrochromium which is dissolved and 99.80% chromium electrodeposited in diaphragm cells from a chromium-alum solution. Photographs, tables, diagram. (C23, Cr)

221-C. Production of Uranium Metal. D. S. Arnold, C. E. Polson and E. S. Noe. *Mining Engineering,* v. 8, June 1956, p. 608-610.

Description of process steps to produce uranium reactor fuel elements to meet stringent specifications. Photograph, diagrams. (C general, U)

222-C. Extraction Metallurgy. Graham Oldham. *Mining Journal (Annual Review),* May 1956, p. 141 + 4 pages.

Review of world-wide literature on recent developments covers metal reduction processes, chemical extraction, exchange resins, roasting and smelting, electrolytic methods, metal refining. Photographs. 34 ref. (C general)

223-C. (German.) **Methods and Processes of Metal Degasification. I.** W. Espe. *Vakuum-Technik,* v. 5, no. 3, May 1956, p. 39-54.

Causes of gas inclusions, amount and type of gas, degasification of metals during smelting. Graph, diagrams, photographs, tables. (C25)

224-C. (German.) **Review of Processes for Production of Metallic Uranium and Thorium for Use as a Nuclear Fuel.** Günter Wirths. *Zeitschrift für Metallkunde,* v. 47, no. 5, May 1956, p. 280-288.

High-purity nitrate solutions are obtained by extraction. Methods for obtaining compounds suitable for producing metals by reduction. Customary reduction processes. Experiments in pyrometallurgical refining of uranium. Tables. 17 ref. (C general, B14, Th, U)

225-C. Research on Intermetallic Containers for Melting Titanium. *Alfred University. Quarterly Progress Report No. 1, for Wright Air Development Center, Contract No.* AF33 (616)3172, Sept. 1, 1955, Nov. 30, 1955. 10 p.

Reports on preparing intermetallic compounds, fabricating crucibles, melting procedure and evaluating melts. (C5, B19, Ti)

226-C. Process for Fission-Product Removal From Uranium-Bismuth Reactor Fuels by Use of Fused-Salt Extraction. O. E. Dwyer. *A.I.Ch.E. Journal,* v. 2, June 1956, p. 162-168.

Process design considerations and proposed flow sheets. (C general, Bi, U)

227-C. Liquid-Metal Extraction for Processing of Spent Fuel. A. F. Voigt, A. H. Daane, E. H. Dewell, R. G. Clark, J. E. Gonser, J. F. Haefling and K. L. Malaby. *A.I.Ch. E. Journal,* v. 2, June 1956, p. 169-173.

Use of silver, cerium and lanthanum for removal of plutonium and fission products from irradiated uranium by liquid-metal extraction. (C28, U, Ag, La, Ce)

228-C. Continuous Casting of Bronze. J. B. Mohler. *Automation,* v. 3, July 1956, p. 42-45.

Furnace operation, material handling, control variables and die details in relation to production flexibility. (C5, Cu)

229-C. Vacuum Distillation of Metals. A. J. Martin. *Metal Industry,* v. 88, June 8, 1956, p. 473-476.

Theoretical considerations. (To be continued.) (C22)

230-C. Vacuum Distillation of Metals. II. Practical. A. J. Martin. *Metal Industry,* v. 88, June 15, 1956, p. 495-498.

Reduction processes, purification processes, decorative, protective and miscellaneous applications. (C25, C22, L25)

231-C. The Electrolytic Preparation of Small Quantities of Alkali Metals. P. S. Baker, G. F. Wells and W. R. Rathkamp. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission),* ORNL-1468, Jan. 1953, 15 p.

Development and operation of miniature cell for preparation of alkali metals from small amounts of their salts. (C23, Li, EG-e)

232-C. Distillation Separation of Zirconium and Hafnium. Gordon C. Williams, S. V. Galginaitis, E. G.

Baker, Jr., A. H. Isaacs, E. W. Holzknecht, R. A. Gillespie, R. G. Moody and L. A. Graham. *University of Louisville, (U. S. Atomic Energy Commission)*, NY00-1009, Aug. 1950, 165 p.

Distillation techniques applied to the separation of hafnium and zirconium phosphorus oxychloride complexes. Discusses determination of vapor pressure of technical $ZrCl_4$, and chemical methods of converting $POCl_3$ and PCl_5 complexes of $ZrCl_4$ to ZrO_2. (C22, Hf, Zr)

233-C. (Russian.) **Preparation of Pure Metals by Zone Crystallization. I. Preparation of Pure Tin. II. Preparation of Pure Tin by a Combination of Zone Crystallization and Purification From Highly Volatile Impurities by Lengthy Heating in High Vacuum.** B. N. Aleksandrov, B. I. Verkin and B. G. La'zarev. *Fizika Metallov i Metallovedenie*, v. 2, no. 1, 1956, p. 93-104.

Relation of impurity content of tin to number and rate of zone recrystallizations. Redistribution of impurities in lead ingots after repeated fractional zone recrystallizations. Relation of residual resistance to number of zone crystallizations for various kinds of lead and to thickness of layer being heated.
(C general, Pb, Sn)

234-C. (Russian.) **Investigation of the Mechanism of the Purification of Metals by Zone Recrystallization.** B. N. Aleksandrov, B. I. Verkin, I. M. Lifshits and G. I. Stepanova. *Fizika Metallov i Metallovedenie*, v. 2, no. 1, 1956, p.105-119.

Role of movements of the crystallization boundary as well as role of diffusion and convection mixing within the zone. Equations for complete intermixing within the zone. Distribution of impurities, use of radioactive tracers as impurity metals. (C general, Pb, Sn)

235-C. Mechanism of Electrical Conduction in Molten Cu_2S-Cu Cl and Mattes. Ling Yang, G. M. Pound and G. Derge. *Journal of Metals*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, June 1956, p. 783-788.

Specific conductance and its temperature dependence measured over entire composition range. Facts are interpreted in terms of electron energy level diagrams by analogy to the situation in solids. (C23, Cu)

236-C. Development of Arc-Cast Molybdenum. Alvin J. Herzig. *Metal Progress*, v. 70, July 1956, p. 103-109.

Molybdenum-base alloys have become commercially available after a long and often discouraging development program. (C25, Mo)

237-C. High Vacuum, Everywhere in Industry. John H. Durante. *Research & Engineering*, v. 2, July 1956, p. 22-25.

Present and future applications. (C25, D8)

238-C. (Czech.) **The Significance of Preliminary Alloys in the Production of Alloys of Nonferrous Metals.** Adolf Valasek. *Hutnik*, v. 6, no. 5, May 1956, p. 140-144.

The effect of higher quality addition alloys in improving the quality of products made of nonferrous metals. Preparation of these alloys by direct heating, thermal reduction of the oxides of one of the component ores, electrolytic processes, and the reaction of a salt of one of the component ores.
(C general, B22, EG-a, Al, Cu)

239-C. (German.) **Preparation of Titanium Metal Through Its Sulfide.** Robert Schwarz and Alfred Köster. *Zeitschrift für Anorganische und Allgemeine Chemie*, v. 285, no. 1-2, May 1956, p. 1-4.

TiS_2 and Ti_2S_3 treated with various reduction agents such as hydrogen, calcium, calcium hydride, aluminum and magnesium.
(C general, Ti)

240-C. (Italian.) **Continuous Casting—Production of Aluminum Rolled Wire Using The Properzi System.** U. Lecis. *Alluminio*, v. 25, no. 6, June 1956, p. 275-278.

Aspects of casting with the Properzi system and an analysis of results obtained. The electrical and mechanical characteristics of aluminum wire for electrical conductors. (C5, F28, P15, Q general, Al)

241-C. Refining Antimony by Electrodeposition and by Distillation. R. R. Rogers and R. A. Campbell. *Canada, Department of Mines and Technical Surveys, Mines Branch Technical Paper No.* 11, 1955, 14 p.

Crude antimony can be refined by distillation, by electrolytic means, or by a combination of these two methods. The degree of refinement varies with the proportions of impurities present, and the refining method used. (C22, C23, Sb)

242-C. An Electrolytic Method for the Direct Production of Magnesium Lithium Alloys From Lithium Chlo-

ride. J. Smolinski, J. C. Hannam and A. L. Leach. *Journal of Applied Chemistry,* v. 6, Apr. 1956, p. 187-196.

Made by electrolytic deposition of lithium onto a magnesium cathode from a molten 50% lithium chloride, 50% potassium chloride, or 75% lithium chloride, 25% barium chloride electrolyte at 560 to 630° C. (C23, Mg, Li)

243-C. The Isolation in Quantity of Individual Rare Earths of High Purity by Ion Exchange. F. H. Spedding and J. E. Powell. Paper from "Ion Exchange Tecnnology", Academic Press Inc., p. 359-390.

Theoretical aspects, small pilot plant experience, abundance, occurrence and uses for rare earths, design of an ion exchange separation plant. (C general, EG-g)

244-C. The Use of Chlorine in the Extraction of Metals for the Atomic Energy Programme. A. B. McIntosh. *Industrial Chemist,* v. 32, May-June 1956, p. 195-199.

Properties and history of chlorides of various metals suitable as nuclear fuels. Modern extraction methods using chlorine. (C4, T25)

245-C. Casting Wheel Cakes Copper for Continuous Strip. *Iron Age,* v. 178, Aug. 2, 1956, p. 94-95.

Vertical casting wheel allows production of 40 tons per hour of high grade, electrolytically pure copper in cakes weighing 2000, possibly 4000 lb. (C5, Cu)

246-C. An Investigation on the Function of Ingot Mould Dressings. D. R. Thornton. *Iron and Steel Institute, Journal,* v. 183, July 1956, p. 300-315.

The volatile dressings offer most advantage, bituminous paint appearing to be the best. Coal tar and charcoal-based dressings are almost as effective in reducing surface defects, but are more difficult to use. (C5, D9)

247-C. (Russian.) **Problem of the Reduction of Columbium Pentoxide and Tantalum Pentoxide by Hydrogen.** A. V. Lapitskii, Iu. P. Simanov and E. P. Artamonova. *Zhurnal Neorganicheskoi Khimii,* v. 1, no. 4, 1956, p. 641-649.

Variation in results, depending on previous heating and on reduction temperatures. Effect of rate of gas flow on the intensity of reduction, reduction of the two pentoxides separately and as mixtures, effect of composition of the mixtures. (C2, Ta, Cb)

248-C. (Russian.) **Ridding Columbium of Accompanying Titanium by Means of Cationites.** S. I. Solov'ev, E. I. Krylov and L. P. Kononova. *Zhurnal Neorganicheskoi Khimii,* v. 1, no. 4, 1956, p. 660-663.

Method of separation is based on the ability of freshly precipitated columbic acid, after treatment with concentrated hydrochloric acid, to become a colloidal solution that is not adsorbed by the cationite, whereas the titanium and other impurities are eliminated by means of ion-exchange adsorption. (C general, Cb, Ti)

249-C. (Book.) **Ion Exchange Technology.** F. C. Nachod and Jack Schubert, editors. 660 p. 1956. Academic Press, 125 E. 23rd Street, New York 10, N. Y. $15.00.

Fundamental problems, techniques, and operations of ion exchange such as mass transfer, equipment design, properties of ion exchange resins, and deionization. (C general, B14, A8)

250-C. Chemical Treatment of Molten Metals. D. V. Atterton. *Australasian Engineer,* v. 48, June 1956, p. 64-72.

Modern chemical methods of treating molten light and copper-base alloys for fluxing, gas removal and grain refinement. Physical and chemical theories underlying such treatments. (C5, E25, Mg, Cu, Al)

251-C. Principles and Limits of Vacuum Melting. W. Deisinger. *Henry Brutcher, Translation No.* 3754, 10 p. (Abridged from *Berg-und Hüttenmännische Monatshefte,* v. 100, no. 7-8, 1955, p. 214-218.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 183-C, 1955. (C25, C21)

252-C. High Vacuum Arc Melting of Refractory Metals. F. Benesovsky, K. Sedlatschek and W. Wirth. *Henry Brutcher, Translation No.* 3687, 9 p. (Abridged from *Berg-und Hüttenmännische Monatshefte,* v. 100, no. 7-8, 1955, p. 219-224.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 184-C, 1955. (C25, Mo, Cb, Ti, W, Zr)

253-C. The Reduction of Ore to Metal. L. M. Pidgeon. *Metal Progress,* v. 70, Aug. 1956, p. 81-85.

Four widely used methods discussed with their limitations and advantages. (To be continued.) (C general)

254-C. Application of Liquid-Liquid Extraction for the Separation of Zirconium From Hafnium. R. A. Foos and H. A. Wilhelm. *Iowa State College (U. S. Atomic Energy Commission),* ISC-693, July 1954, 38 p.

Many single and multistage extractions employing immiscible organic solvents were carried out on aqueous solutions of the compounds to be separated. Analyses of the equilibrium phases allowed calculation of individual distribution coefficients and their separation factors. (C general, Zr, Hf)

255-C. Application of Liquid-Liquid Extraction to the Separation of Tantalum From Niobium. Raymond A. Foos and H. A. Wilhelm. *Iowa State College (U. S. Atomic Energy Commission),* ISC-694, July 1954, 71 p.

Tantalum and columbium spectrographically free of each other were prepared in quantity on a continuous basis, using many organic solvents. The most effective separation was obtained when the free hydrofluoric acid content was low. (C28, Ta, Cb)

256-C. Complex Metallurgy by Cerro de Pasco. I. L. Barker. *Journal of Metals,* v. 8, sec. 1, Aug. 1956, p. 1058-1064.

Operations of the Cerro de Pasco Corp. in Peru, summary of recent developments. (G21, C23, Cu)

257-C. Melting and Fabricating Binary Uranium Alloys. F. R. Lorenz, W. B. Haynes, and E. S. Foster. *Journal of Metals,* v. 8, sec. 1, Aug. 1956, p. 1076-1080.

Vacuum induction melting and consumable electrode arc melting were combined into a duplex melting technique enabling the production of sound, homogeneous ingots up to 4-in. diam, weighing approximately 50 lb. (C5, U)

258-C. Recent Developments in Electrolytic Copper Refining. Stuart S. Forbes. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, sec. 1, Aug. 1956, p. 1081-1086.

Changes and additions made to the Canadian Copper Refiners Ltd. electrolytic refinery between 1949 and 1955. Effect of high current density on current efficiency and section work. (C23, Cu)

259-C. Silicothermic Reduction of Magnesia and Ferrosilicon Activities. Bernt Ellingsaeter and Terkel Rosenqvist. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, sec. 1, Aug. 1956, p. 1111-1112.

Briquettes of burned dolomite and Fe-Si alloys were placed in a 1-in. heat resistant steel tube and heated to 1200 C. By means of a flow of purified hydrogen, the magnesium vapor was swept into a condenser filled with steel wool. From the amounts of hydrogen used and magnesium condensed the magnesium partial pressure was calculated. (C26, Mg, Fe, Si)

260-C. Helium and Argon as Inert Atmospheres in Producing Titanium. C. T. Baroch, T. B. Kaczmarek and J. F. Lenc. *U. S. Bureau of Mines, Report of Investigations 5253,* July 1956, 17 p.

High-purity argon can be substituted for helium in reduction of titanium-tetrachloride with magnesium. (C4, Ti)

261-C. (French.) Research on the Preparation of Germanium by Igneous Electrolysis. *Journal du Four Electrique,* v. 65, no. 4, July-Aug. 1956, p. 131-132.

The preparation of germanium and of its binary alloys by electrolysis of baths of melted germanate or of germanium oxide dissolved in metal salts. (C23, Ge)

262-C. (French.) Purification of Titanium by the Iodide Process. R. Lignon. *Revue de Métallurgie,* v. 53, no. 7, July 1956, p. 503-509; disc., p. 509.

Kinetics of titanium iodide formation through direct action of iodine vapor upon titanium. Characteristic curves of the reaction. (C4, Ti)

263-C. (German.) Smelting and Casting of Titanium and Titanium Alloys. Hans-Walter Schleicher. *Giesserei,* v. 43 no. 17, Aug. 16, 1956, p. 445-450.

Smelting, chill casting and continuous casting of titanium and its alloys. Studies of properties, special smelting conditions, types of furnaces, gas atmosphere and additions. (C21, C5, Ti)

264-C. (German.) Potassium Titanium Fluoride Electrolysis in Smelted Mixtures With Potassium Chloride-Sodium Chloride. P. Drossbach and E. Rossberger. *Zeitschrift für Elektrochemie,* v. 60, no. 5, May 1956, p. 470-473.

Measurements of polarization tension and single potentials. Formation of three-valency titanium complex with 97.5 to 99.7% metal content. (C23, Ti)

265-C. (Czech.) Raising of Electrical Conductivity of Commercial Aluminum. Rudolf Pelzl. *Hutnické Listy,* v. 11, no. 8, Aug. 1956, p. 477-480.

Uses a flux mixture of borax, cryolite and common salt. (C23, P15, Al)

266-C. (German.) Extracting and Refining Metals by the Mercury Extrac-

tion Method. Heinz Borchers. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 9, no. 8, Aug. 1956, p. 383-387, disc., 387-388.

Mercury as a solvent for precious metals. Its use in extracting aluminum from crude alloys and in refining scrap metals.
(C29, A8, EG-c, Al)

267-C. (Italian.) **The Metallurgy of Uranium and Thorium. II. Production of Metallic Uranium.** A. Cacciari, R. De Leone, C. Fizzotti and M. Gabaglio. *Energia Nucleare,* v. 3, no. 3, June 1956, p. 154-167.

Production methods in France, Italy, Sweden and Belgium.
(C general, U, Th)

268-C. Preparation of High Purity Rhenium. D. M. Rosenbaum, R. J. Runck and I. E. Campbell. *Electrochemical Society, Journal,* v. 103, Sept. 1956, p. 518-521.

Rhenium powder containing a maximum of 0.05% impurities was prepared by hydrolysis of rhenium pentachloride and subsequent hydrogen reduction of the resultant hydrated rhenium dioxide.
(C general, H10, Re)

269-C. Uranium Purification by Electrorefining. Leonard W. Neidrach and Arthur C. Glamm. *Electrochemical Society, Journal,* v. 103, Sept. 1956, p. 521-528.

Use of low-melting alloys with nickel to obtain molten products at temperatures below the melting point of pure uranium. Effects of temperature, current and salt-bath composition on cell efficiency and operation. (C23, U)

270-C. Vacuum Melting Improves Properties of New Alloy. *Iron Age,* v. 178, Sept. 20, 1956, p. 100-101.

Superior properties imparted to Hastelloy R-235 by vacuum melting include 20% higher stress-to-rupture for 100 hr. at 1500° F. and better impact strength. (C25, Q4, Q6, Ni)

271-C. Investigation of the Iodide Method for Refining Zirconium. I. Factors Influencing the Rate of the Refining Process. V. S. Emel'yanov, P. D. Bystrov and A. I. Evstyukhin. *Henry Brutcher Translation No.* 3785, 17 p. (From *Journal of Atomic Energy USSR,* v. 1, no. 1, 1956, p. 43-51.) Henry Brutcher, Altadena, Calif.

Effect of filament temperature and other process variables on rate and yield. (C4, Zr)

272-C. (French.) **Preparation of Pure Metallic Scandium Ingots Using a Calcium Thermic Method.** Jean-Claude Achard, Paul Caro and Jean Loriers. *Comptes Rendus,* v. 243, no. 5, July 30, 1956, p. 493-495.

An efficient method used in France, with action of calcium on fluoride in a tantalum crucible. A hexagonal compact structure was obtained, and also a cubic form with centered faces. (C4, Sc)

273-C. (German.) **The Economy of Electric Smelting of Aluminum.** K.-H. Brokmeier. *Aluminium,* v. 32, no. 9, Sept. 1956, p. 550-553.

Comparison of four types of furnaces including installation costs and operation charges. (C21, Al)

274-C. (Russian.) **Study of the Anode Process in an Aluminum Bath.** L. N. Antipin and A. N. Khudiakov. *Zhurnal Prikladnoi Khimii,* v. 29, no. 6, June 1956, p. 908-914.

Relation of the composition of anode gases and magnitude of polarization to current density. Kinetics of the electrolytic process, description of the relation of the potential of a carbon anode to current density by means of an equation for a gas-oxygen electrode.
(C23, Al)

275-C. Symposium on the Extraction Metallurgy of Some of the Less Common Metals. S. W. F. Patching. *Industrial Chemist,* v. 32, Sept. 1956, p. 351-358.

Various processes applicable to uranium, vanadium, columbium, beryllium, thorium, titanium, zirconium and other metals.
(C general, B14)

276-C. Preparation of Ingots of Uranium-Niobium Alloy. O. N. Carlson, N. Ida, D. Peterson, F. Tate and H. S. Wilhelm. *Iowa State College, Ames Laboratory (U. S. Atomic Energy Commission),* ISC-743, July 1956, 9 p.

Preparation of a uranium, 10 wt. % niobium alloy by the bomb reduction of Na_2NbOF_5 and uranium tetrafluoride with calcium.
(C5, C4, U, Cb)

277-C. Preparation of Yttrium Metal by Reduction of Yttrium Trifluoride With Calcium. O. N. Carlson, F. A. Schmidt and F. H. Spedding. *Iowa State College, Ames Laboratory (U. S. Atomic Energy Commission),* ISC-744, July 1956, 22 p.

Alternate methods employing the formation of a low-melting yttrium-magnesium intermediate alloy are evaluated. (C26, Y)

278-C. (English.) **Studies on Electrolytic Refining of Zinc. I. The Solubility of Lead in Zinc Sulfate-Sulfuric Acid Electrolyte.** Motoo Watanabe

and Seitaro Fukushima. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 8, no. 2, Apr. 1956, p. 142-148.

Lead solubility is mainly affected by free sulfuric acid concentration and temperature. (C23, P13, Zn, Pb)

279-C. (German.) **Preparation of Calcium of High Purity.** K. Akerman and M. Orman. *Acta Technica Academiae Scientiarum Hungaricae,* v. 15, no. 1-2, 1956, p. 179-189.

High-purity calcium was obtained by distillation and fractional condensation of the raw materials. (C22, Ca)

280-C. **The Current Status of Research and Development on Electrolytic Titanium.** M. E. Sibert and M. A. Steinberg. *Journal of Metals,* v. 8, Sept. 1956, p. 1162-1168.

Literature background and process evaluation for electrolysis of titanium halides and oxides and for soluble anode fusion electrolysis. (C23, Ti)

281-C. **Magnetite in the Hurley Copper Smelter.** H. W. Mossman. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Sept. 1956, p. 1182-1191.

Background of smelter, behavior of magnetite in the reverberatory furnace, chemical reduction and formation of Fe_3O_4 in the slag. (C21, Fe, Cu)

282-C. **An Investigation of the Iodide Method of Refining Zirconium. Factors Influencing the Rate of the Refining Process.** V. S. Emelyanov, P. D. Bystrov and A. I. Evstyukhin. *Journal of Nuclear Energy,* v. 3, Aug. 1956, p. 121-131.

Shows that pressure of tetra-iodide in reaction vessel has great influence upon course of refining process. (C4, Zr)

283-C. **Liquid-Liquid Extraction of Molten Uranium With Silver.** C. W. Watson and G. H. Beyer. *Ames Laboratory (U. S. Atomic Energy Commission),* ISC-696, Mar. 1956, 27 p.

Investigation to develop equipment and technology and some of the problems that might be expected in the processing of molten reactor fuels. (C general, U, Ag)

284-C. **Preparation of Zirconium From Zirconium Tetrafluoride.** C. J. Baroch and G. H. Beyer. *Ames Laboratory (U. S. Atomic Energy Commission),* ISC-720, May 1956, 18 p.

Experimental bomb reductions of this compound with magnesium. Results show that higher purity zirconium can be produced by this method. (C26, Zr)

285-C. **Ferrosilicon Manufacture at Marietta.** E. E. Thum. *Metal Progress,* v. 70, Oct. 1956, p. 65-72.

Cross-sectional drawing of submerged arc furnace and essential details of plant and operation for silicon metal and ferrosilicon. Production data. (C21, Si, Fe-n)

286-C. **Limitations to Processes Using a Metal as a Reducing Agent.** L. M. Pidgeon. *Metal Progress,* v. 70, Oct. 1956, p. 79-82.

Use of magnesium and calcium is limited by properties such as the free energy of formation of their slag reaction products, melting and boiling points, and tendency to alloy with the desired metal as it is produced. (C26, Mg, Ca)

287-C. (Russian.) **Electrochemical Separation of Binary Lead-Copper-Silver Alloys in a Melted Electrolyte.** A. A. Kolotii and In. K. Delimarskii. *Ukrainskii Khimicheskii Zhurnal,* v. 22, no. 4, 1956, p. 466-471.

Results of measurement of the equilibrium potentials of lead-silver and lead-copper in melted eutectic $PbCl_2$-KCl-NaCl. Measurement of anodic polarization. (C23, Pb, Ag, Cu)

288-C. **The Aluminium Smelter—Bell Bay, Tasmania.** *Light Metals,* v. 19, Oct. 1956, p. 317-319.

A tour of the first aluminum plant south of the equator, capable of producing 13,000 tons of aluminum per year. (C23, Al)

289-C. **Vacuum Metallurgy.** E. C. Roberts. *Trend in Engineering (University of Washington),* v. 8, Oct. 1956, p. 15-18.

Discusses thermal reduction, melting and casting, distillation and heat treatment. (C25, J2)

290-C. **Arc Melting Kroll Zirconium Sponge.** G. L. Miller. *Vacuum,* v. 4, Apr. 1954, p. 168-175.

Details an arc melting method developed for production of zirconium and zirconium alloy ingots. (C25, Zr)

291-C. (Czech.) **Making Ductile Zirconium by the van Arkel Method.** Frantisek Plzak. *Hutnické Listy,* v. 11, no. 9, Sept. 1956, p. 518-522.

Purest zirconium is made by the van Arkel method of thermal decomposition of zirconium iodide on a tungsten or zirconium filament heated to 1400° C. (C4, Zr)

292-C. (Czech.) **Production of Alpax (Silico-Aluminum) by Fractional Crystallization.** Albert Regner. *Hutnické Listy,* v. 11, no. 9, Sept. 1956, p. 514-518.

A process whereby the silicon is precipitated from a master mix in a stirred crucible and the pure eutectic remains behind. (C28, Al, Si)

293-C. (French.) **The Manufacture and Use of Ferro-Alloys.** H. Cartoux. *Chimie & Industrie,* v. 76, no. 3, Sept. 1956, p. 453-470.

Ferro-alloys are prepared in electric furnaces by reduction with carbon, or by aluminothermy or silicothermy for special alloys with low carbon content. (C21, Fe)

SECTION D

FERROUS REDUCTION and REFINING

1-D. Mexico's Most Modern and Largest Steel Plant. Gordon Bennett. *Blast Furnace and Steel Plant,* v. 43, Nov. 1955, p. 1267-1270, 1272, 1281.

Facilities, including power plant, blast furnace, openhearth and hot and cold mills. Photographs. (D general, ST)

2-D. Casting Pit Practice. G. Reginald Bashforth. *British Steelmaker,* v. 21, Oct. 1955, p. 316-320.

Discusses change from liquid to solid, solution required, reaction products, tap holes, ladle linings, center feed, manganese difficulties, successful tundishing and splash control. Photographs, diagrams. 7 ref. (D9, ST)

3-D. When an Atomic Man Pokes Into a Steel Mill. *Business Week,* 1955, no. 1365, Oct. 29, p. 44-46, 52, 54.

Since July 1954, one steel company has been researching into possible uses of atomic energy in producing steel. (D general, ST)

4-D. Out Goes Hydrogen. *Steel,* v. 137, Nov. 14. 1955, p. 120, 123.

Process used in Germany for degassing tonnage steel is being introduced to U. S. mills; shows three variations. Photograph, diagrams, table. (D general, ST)

5-D. (Czech.) **Contribution to the Diagram of the Specific Coke Consumption in Blast Furnaces.** Jindrich Sarek. *Hutnické listy,* v. 10, no. 10, Oct. 1955, p. 577-580.

Multiplying the amount of slag by the amount of coke necessary for the reduction and melting of one ton of produced pig iron, figures for a diagram of specific coke consumption can be obtained. Diagrams. 7 ref. (D1, Fe)

6-D. (Czech.) **The Effect of the Chemical and Mineralogical Composition of Talbot Slags on Their Solubility.** Theodor Myslivec, A. Waleczek and P. Kuhn. *Hutnické listy,* v. 10, no. 10, Oct. 1955, p. 605-609.

Chemical conditions for the formation of soluble phosphorus slags produced as a byproduct in the production of steel in 250-ton tilting openhearth furnaces and used for producing Thomas powder. Compounds were determined which cause a substantial decrease of the solubility of phosphorus slags. Graphs, micrographs. 15 ref. (D2, B21, ST)

7-D. (French.) **The Problem of Red Smokes. A Pilot Plant for the Precipitation of Iron Oxide Dusts.** P. Leroy and L. Septier. *Institut de recherches de la sidérurgie, Publications,* ser. A. no. 102, July 1955, 37 p.

Description and operation of the pilot plant, characteristics of dusts precipitated, possibilities of using these dusts. Diagrams, photographs, graphs, tables. (D1, Fe)

8-D. (German.) **Special Questions of Blast Air Supply in Smelting Works.** Hans Pötzschner and Joachim Tischendorf. *Metallurgie,* v. 5, no. 9, Sept. 1955, p. 272-280.

Methods of recording which deal with characteristics of conduits and shaft furnaces. Graphs, diagrams, tables. 4 ref. (D1)

9-D. Bottom Materials and Bottom Maintenance. H. C. Bigge. *Electric Furnace Steel Conference, Proceedings,* v. 12 1954, p. 46-56.

A 96% magnesium oxide rammed bottom installed by the coke process, with holes drilled in the shell, makes the most efficient installation to date. Washing of the bottom periodically lessens contamination and produces cleaner steel. Tables, photographs, diagram. 5 ref. (D5, ST)

10-D. Side Walls and Side-Wall Maintenance. J. E. Harrod. *Electric*

Furnace Steel Conference, Proceedings v. 12, 1954, p. 64-67.

Side wall life can be extended by careful scheduling of alloy steel heats with stainless steel heats combined with prompt maintenance practice. (D5, AY, SS)

11-D. Side Walls and Their Maintenance. R. J. McCurdy. *Electric Furnace Steel Conference, Proceedings,* v. 12, 1954, p. 67-69; disc., p. 69-74.

Furnace design and matching of electrodes to avoid hot spots; patching practice; new Cohart refractory. Tables, photographs. (D5, ST)

12-D. Construction and Maintenance of Roofs on Large Top-Charged Electric Furnaces. K. L. Grant. *Electric Furnace Steel Conference, Proceedings,* v. 12, 1954, p. 74-81; disc., p. 81-84.

Design of roof rings, roofs and refractories and their maintenance. A roof, 20 ft. in diameter, weighing 37 tons, for an 85-ton furnace, discussed. Photographs. (D5, ST)

13-D. Effect of Intermittent Operations on Refractories. A. K. Blough and D. M. Schrader. *Electric Furnace Steel Conference, Proceedings,* v. 12, 1954, p. 84-86.

Short period shutdowns favor small furnace performance, but large (50-ton) furnace performance is depressed. Some results cannot be explained. Graphs. (D5, ST)

14-D. New Developments in Exothermic Hot Topping of Ingots. Michael Bock, II. *Electric Furnace Steel Conference, Proceedings,* v. 12, 1954, p. 163-169; disc., 169-173.

Aluminum-iron oxide hot topping and exothermic mold mixtures used to control ingot pipes and flaws. Photographs, table, graph. (D9, SS, ST)

15-D. Addition of Special Minor Elements to Electric Furnace Heats. Charles W. Sherman. *Electric Furnace Steel Conference, Proceedings,* v. 12, 1954, p. 182-183.

Minor elements and techniques for their inclusion. (D5, ST)

16-D. Use of High-Alumina Brick in the Single-Slag Basic Practice. Vincent E. Belusko. *Electric Furnace Steel Conference, Proceedings,* v. 12, 1954, p. 184-192; disc., p. 192-193.

Change in design to a higher roof permits high-alumina brick to be used for a two to three-fold increase in refractory life. Table, photographs. (D5, ST)

17-D. Ladle Lining and Practice for Stainless Steel. H. R. Lewis. *Electric Furnace Steel Conference, Proceedings,* v. 12, 1954, p. 204-205; disc., p. 205-207.

Design of a teapot ladle for a 5000-lb. charge of metal at 3200 to 3300° F. The teapot ladle is preferred here. (D9, SS, AY)

18-D. Efficiencies of Electric Furnaces Can Be Increased by Using Higher Voltages. E. L. French. *Journal of Metals,* v. 7, Nov. 1955, p. 1169-1171.

New design, advantages of higher voltages in larger corbide and ferroalloy furnaces. Graphs. (D5, C-n, Fe-n)

19-D. Oxygen Refining of Stainless Steels in Electric Arc Furnace. F. Cless. *Henry Brutcher Translation No.* 3104, 23 p. (Condensed from *Radex Rundschau,* 1951, no. 8, p. 341-354.) Henry Brutcher, Altadena, Calif.

Physical chemistry of the oxygen treatment of 18-8 and 19-10-2 stainless scrap in the basic arc furnace. Effect of amount of chromium in charge and of furnace size upon chromium recovery. Tables, graphs, photographs, micrographs. 21 ref. (D5, SS, Cr)

20-D. (Russian.) **Thermotechnical Conditions for the Operation of Open-Hearth Furnaces Above Usual Capacities.** I. M. Koburneev. *Stal',* v. 15, no. 10, Oct. 1955, p. 895-904.

Design elements to eliminate time loss on melting operations; improvement of fuel efficiency; calculations of thermal resistance of bath; techniques of charging furnace; charge melting conditions. Graphs, tables, diagram. 9 ref. (D2, CI)

21-D. (Russian.) **Use of Protective Heat Resistant Section in Front of Acicular Recuperator.** B. L. Poletaev and A. A. Sorokin. *Stal',* v. 15, no. 10, Oct. 1955, p. 945-947.

Operational efficiency and service life of these recuperators can be increased by setting protective sections of heat resistant piping in front of them to bear the brunt of thermal shocks inevitably present in heating furnaces of high thermal capacity. Diagrams, tables. 2 ref. (D general)

22-D. Sulphur Distribution Between Flame and Slag in the Open Hearth Furnace. George St. Pierre. *Industrial Heating,* v. 22, Nov. 1955, p. 2306 + 5 pages.

Chemical reactions occurring between sulfur-bearing gases and slags. Graphs, tables. 7 ref. (D2)

23-D. New Hot Tops Save Metal, Make Sounder Ingots. H. D. Shephard. *Iron Age,* v. 176, Nov. 24, 1955, p. 79-82.

New moldable, exothermic mate-

rial for hot top lining. Photographs, diagrams. (D9)

24-D. Jones & Laughlin. . .Aliquippa Works. T. J. Ess. *Iron and Steel Engineer,* v. 32, Nov. 1955, p. 74-103.

Plant operation and production methods. Photographs, tables, diagrams. (D general, A5, Fe, ST)

25-D. Electric Smelting of Titaniferous Ironsands at Onekaka. T. Marshall and D. S. Nicholson. *New Zealand Journal of Science and Technology,* v. 37, sec. B, no. 2, Sept. 1955, p. 201-220.

Theoretical aspects. Iron sands could be smelted in a continuously operated electric furnace. Diagram, tables, graphs. 9 ref. (D5, Fe)

26-D. (French.) **Economical Considerations of Gas Pipe Diameters Used in Blast Furnaces.** M. J. Szczeniowski. *Centre de Documentation Siderurgique, Circulaire d'Informations Techniques,* v. 12, no. 10, 1955, p. 2007-2011.

Calculations are made with respect to determining the diameter that affords the maximum economy in gas supply, its variation as a function of average flow, number of hours in service, capital investment, other factors. Graphs. (D1)

27-D. (German.) **Production of Pig Iron in the Electric Smelting Furnace.** Borut Marincek. *Stahl und Eisen,* v. 75, no. 22, Nov. 3, 1955, p. 1426-1432.

Ore-reducing conditions; possibilities of reducing current and coal consumption; utilization of slag and top gas. Graphs, tables, photograph. 2 ref. (D5, D8, Fe)

28-D. (German.) **The Use of Oxygen for Raising the Refining Speed.** Hans Kosmider. *Stahl und Eisen,* v. 75, no. 22, Nov. 3, 1955, p. 1433-1439.

Volume of oxygen required for the combustion and slagging of the accompanying elements of pig iron. Decarburizing rate and shortening of the refining time with openhearth melts produced by different pig iron charges, shown as dependent on the oxygen input per time unit. Graphs. (D2, Fe)

29-D. (German.) **Design and Equipment of Modern Stationary Open-Hearth Furnaces.** Henno-Franz Strähuber. *Stahl und Eisen,* v. 75, no. 22, Nov. 3, 1955, p. 1439-1445.

Design details of the Maerz 150-ton furnace, covering the slag chamber doors, arrangements of measuring spots, use of immersion pyrometers, abandonment of the full-automatic reversing system of the generators, and the atomization of oil by blast furnace gas. Diagrams, photographs. 2 ref. (D2)

30-D. (German.) **The Use of Graphite Electrodes in Electric Arc Furnaces.** Georg Moll. *Stahl und Eisen,* v. 75, no. 22, Nov. 3, 1955, p. 1445-1452.

Characteristics and carrying capacity of graphite electrodes; methods of locking nipple joints to avoid loosening and advantages of conical nipples; specific electrode consumption in electric steel melting; compares graphite, carbon and Söderberg electrodes. Photographs, graphs, tables, diagrams. 10 ref. (D5)

31-D. (Russian.) **Use of Carbon Blocks in Hearth Well and Hearth of Blast Furnaces.** I. G. Polovchenko. *Stal',* v. 15 no. 10, Oct. 1955, p. 891-894.

Because of their high thermal conductivity, carbon blocks facilitate the work and lengthen service life of the refractory lining. The use of bottom cooling of the hearth well and a deepened "dead" layer of metal is expedient in this set-up. Use of radio-active tracers for following changes in hearth lining. Diagrams, graphs, photograph. (D1, Fe)

32-D. (Russian.) **Determination of Time for Bessemer Converter Blow Operation to Be Stopped.** K. S. Garger and V. D. Umnov. *Stal',* v. 15, no. 10, Oct. 1955, p. 905-909.

Method for stopping blow at desired higher carbon contents is based on recording difference or ratio of currents from two photo-electric cells operating at different points in the spectrum. Graph, diagrams, circuit diagram, tables. 10 ref. (D3, ST)

33-D. (Book.) **Electric Furnace Steel Conference, Proceedings, (Annual Volume),** v. 12, 1954, 222 p. American Institute of Mining and Metallurgical Engineers, 29 West 39th St., New York, 18, N. Y.

Series of papers on vacuum melting, refractory and masonry, melting, ingot quality, and operations in foundry melting. (D5, D8, D9, ST)

34-D. Coreless Induction Furnace. K. Scherzer and F. S. Leigh. *Iron & Steel,* v. 28, Dec. 1955, p. 669-672.

Design, construction and performance data for furnaces now in use in England, Germany and U. S. Graphs, diagrams, photographs. (To be continued.)
(D6, C21, ST, Cu, Al, Ni)

35-D. Rational Distribution of Stock in a Blast Furnace. T. An. Tesch. *Iron and Steel Engineer,* v. 32, Dec. 1955, p. 125-126, 129, 131.

Selective charging system results

in fuel economy, increased production, uniform operation. Table, diagrams, photographs. (D1, ST)

36-D. Electric Steel Production. D. D. Howat. Paper from "Metallurgical Progress—2". Philosophical Library, p. 33-37.

Electric furnace processes, sulfur and hydrogen removal. 48 ref. (D5, Fe)

37-D. (Czech.) Some Problems in the Construction of Arc Furnaces. Karel Rosenzweig. *Hutnik,* v. 5, no. 7, July 1955, p. 197-202.

Design and operational features of Czech designed and manufactured electric arc furnaces for the steel industry. Point-by-point comparison with similar furnaces of Russian, American, English and other makes. Diagrams, table, photographs. 4 ref. (D5, Fe)

38-D. (French.) Processes in the Basic Bessemer Converter. P. Coheur. *Revue universalle des mines,* v. 11, ser. 9, no. 10, Oct. 1955, p. 484-497.

Modifications of the bessemer process as used today and the influence of such variations on the mechanical properties of the finished product. Tables, diagrams, graphs, photographs. 61 ref. (D3, Q general, ST)

39-D. Measuring By-Product Yield of Coke Ovens. F. R. Pullen. *Instruments and Automation,* v. 28, Dec. 1955, p. 2123-2125.

Measurement of foul gas from coke-oven batteries is of primary interest in determining their operating efficiency where oven design, construction, operation and rebuilding are concerned. Photographs, tables, diagram, graph. (D1)

40-D. Process Measurements Lead to Control of Melting Practices. H. H. Johnson and G. A. Fisher. *Journal of Metals,* v, 7, Dec. 1955, p. 1316-1320.

Stresses importance of uniformity of the furnace charges and weighing accuracy; merit of oxygen for producing the boil; charting the chemistry of steel; carbon control; furnace operation. Photographs, table. 2 ref. (D5, D9, ST)

41-D. Factors in Slag Reduction State Detailed for Stainless Melting Practice. D. J. Carney. *Journal of Metals,* v. 7, Dec. 1955, p. 1321-1323.

For optimum recovery of chromium units the chemical, physical and operational factors must be considered. Photograph. 3 ref. (D5, SS)

42-D. Deoxidizers and Tapping Temperatures in Stainless Steel Production. Charles Yutmeyer. *Journal of Metals,* v. 7, Dec. 1955, p. 1325-1326.

Major portion of the deoxidation in the arc furnace is accomplished with silicon, with ferrotitanium frequently used as a finishing deoxidizer. Recommended bath temperatures given, dependent upon destination of mold heat. Photograph. (D5, SS)

43-D. Non-Metallic Inclusions. H. B. Bell. Paper from "Metallurgical Progress—2" Philosophical Library, p. 48-54.

Considers solubility of oxygen in iron and deoxidation by manganese, silicon, aluminum, titanium, chromium, boron, vanadium and zirconium. Graph. 48 ref. (D2, D9, Fe)

44-D. (Czech.) Use of Air Enriched by Water Vapor. Frantisek Houdek. *Hutnik,* v. 5, no. 7, July 1955, p. 194-196.

Czech experiments recommend general application of this device in steel mills because it increases efficiency of blast furnace and lowers relative consumption of coke. Variation of steam content can control chemical composition of the raw iron. Table. (D1, ST)

45-D. (French.) Reduction of Ores by Gases. J. Rosier. *Revue de l'institut francais du pétrole et Annales des combustibles liquides,* v. 10, no. 9, Sept. 1955, p. 1115-1125.

Processes currently under study using blast furnace technology as a norm. Tables, graph. 20 ref. (D8, D1, Fe)

46-D. (French.) Desulfurization With Solid Lime. Sven Eketorp. *Revue de métallurgie,* v. 52, no. 9, Sept. 1955, p. 718-724.

Sulfur content of sponge iron was lowered from 0.3 to 0.03% with a ½ to 1-hr. treatment at 850 to 900° C. Method applies to desulfurization of molten pig iron. Tables, graphs, diagrams. 16 ref. (D8, CI)

47-D. (French.) Compactness and Oxygen Content of Effervescent Basic Bessemer Steel Ingots. Comparison of Different Formulas of Effervescent Steel. A. Delsa. *Revue universelle des mines,* v. 98, ser. 9, no. 11, Oct. 1955, p. 500-508.

Influence of temperature, carbon and manganese additions in the ladle and aluminum in ingot molds on the oxygen content of the products. Compactness of sheet bars studied by torsion tests to determine most favorable conditions of production. Tables. (D3, ST)

48-D. (French.) Compactness and Oxygen Content of Efferescent Basic Bessemer Steel Ingots. Study of Different Methods of Deoxidation. F. Classen. *Revue universelle des mines,*

v. 98, ser. 9, no. 11, Oct. 1955, p. 509-516.

Influence of anthracite, silico-calcium and solid and liquid ferromanganese deoxidizing agents on the effervescence and compactness of ingots. Tables, graphs. (D3, ST)

49-D. (German.) **Efficiency Problems of Openhearth Furnaces Using the Pig Iron-Scrap Process.** Wilhelm Schmitt. *Stahl und Eisen,* v. 75, no. 24, Dec. 1, 1955, p. 1627-1640.

Qualitative systematic coordination of the most important variables which affect the output of furnaces. Graphs, tables, flow diagram. 25 ref. (D2, ST)

50-D. (Polish.) **How to Attain 7 Million Tons of Steel.** Karol Jezierski. *Wiadomosei hutnicze,* v. 11, no. 10, Oct. 1955, p. 297-298.

Reference made to Russian experiences and outline of improvements and changes advisable for Polish steelmaking. (D general, ST)

51-D. (Polish.) **Methods of Closing the Tap-Hole of Openhearth Furnaces.** Wladyslaw Hansel and Waclaw Dakowicz. *Wiadomosci hutnicze,* v. 11, no. 10, Oct. 1955, p. 299-302.

Advantages and disadvantages of various methods critcally analyzed, including "dry", ash, ore and magnesite methods of closing. (D2, ST)

52-D. (Polish.) **Possibility of Reducing the Heating Time of Silica Openhearth Roofs.** Stanislaw Pawlowski. *Wiadomosci hutnicze,* v. 11, no. 10, Oct. 1955, p. 302-306.

Heat curves for silica roofs; relation of mineralogical composition to specific weight of roof components; strength of roof materials before and after heating. Graphs, tables. 6 ref. (D2, ST)

53-D. (Russian.) **Influence of Reducibility of Self-Fluxing Charge on the Operation of Blast Furnace.** A. M. Bannykh and A. G. Neiasov. *Stal',* v. 15, no. 11, Nov. 1955, p. 963-968.

Improvement of quality of self-fluxing charge, by increasing its basicity and reducibilty, is a factor to be considered in increasing the furnace operating potential. Such a charge promotes the use of high-temperature blast. Tables. 4 ref. (D1, Fe)

54-D. (Russian.) **Introduction of a Complex Automatic Heat Control System in an Openhearth Furnace Operating on Crude Oil.** V. P. Borodin, V. F. Demenkov, P. E. Darmanian, and A. A. Iudson. *Stal',* v. 15, no. 11, Nov. 1955, p. 977-983.

Description of system, its components and advantages in comparison with manual and semi-automatic controls. Tables, graphs, diagrams. (D2)

55-D. (Russian.) **Changes in Nitrogen Content in the Electric Arc Furnace Bath With Different Slag Compositions.** F. P. Edneral. *Stal',* v. 15, no. 11, Nov. 1955, p. 994-1000.

Ways to decrease nitrogen content in electric steels. Tables, graphs, diagrams. 5 ref. (D5, ST)

56-D. (Russian.) **Free Carbon From Coal-Tar Pitches and Its Role in the Preparaton of Electrodes and Electrocarbons.** V. N. Krylov. *Zhurnal prikladnoi khimii,* v. 28, no. 11, Nov, 1955, p. 1179-1183.

Properties of free carbon in coal tars, its behavior during coking, as well as its role in electrode technology. Table, graph. 6 ref. (D5)

57-D. (Spanish.) **Influence of the Shape of Ingots and Teeming Time of Surface Defects.** Apolinar Herrero. *Instituto del hierro y del acero,* v. 8, no. 38, July-Sept. 1955, p. 365-369.

Necessity of applying different casting methods, depending on shape and size of ingots, and of perfect heat control of the steel before casting. Table, graphs. 1 ref. (D9 CI)

58-D. Cleaning of Open Hearth Stack Gases. Leslie Silverman. *Industrial Heating,* v. 22, Dec. 1955, p. 2506 + 4 pages.

Reports on cleaning methods combining agglomeration of particles and compact filtration. Table. (To be continued.) (D2)

59-D. Survey of Stainless Steel Melting Points up Rapid Progress. Richard B. Shaw. *Journal of Metals,* v. 7, Dec. 1955, p. 1309-1315.

Calculation of oxygen and silicon requirements for the reduction period. Data on the evaluation of curves, and of hydrogen and oxygen effects. Tables, graphs. 11 ref. (D5, SS)

60-D. Electric Furnacemen Talk Shop. *Steel,* v. 138, Jan. 9, 1956, p. 64, 66.

Stainless and heat resisting steel ingotmaking. Photographs. (D5, SS)

61-D. (Hungarian.) **Designing of Blast Furnaces on the Basis of Capacity Calculation and Determination of Economic Coke Requirements.** György Szöke. *Kohaszati lapok,* v. 10, no. 11, Nov. 1955, p. 481-490.

Concept of production capacity of blast furnaces; determination of its factors. Diagram, tables, graphs. (D1)

62-D. (Hungarian.) **Recent Trends in Converting. Possibilities for Introducing It Into Hungary.** Viktor Zsak. *Kohaszati lapok,* v. 10, no. 11, Nov. 1955, p. 490-495.

Critical examination of various processes, oxygen and pig iron requirements. Tables, graphs, diagram. 8 ref. (D3)

63-D. (English.) **Jointed Metal Furnace Hearths and Regulators (System Javelle).** *Aciers fins & spéciaux francais,* no. 21, Nov. 1955, p. 66-70.

Expanding usage of jointed hearths and regulators. Diagrams, photographs, table. (D2)

64-D. (English.) **Rate of Desulphurization of Molten Iron by Slag Under Reducing Condition.** Tunezo Saito and Yasuji Kawai. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 7, no. 4, Aug. 1955, p. 402-410.

Rate of transfer of sulfur across a metal-slag interface under reducing condition was studied at temperature range from 1440 to 1570° C., using radioactive sulfur, S^{35}. Net rate of transfer from metal to slag increased with increasing basicity of slag and with temperature. Diagrams, graphs, tables. 7 ref. (D general, P12, Fe)

65-D. (Czech.) **Improving the Efficiency of Ingot Hot-Tops and Risers Through the Use of Exothermal or Insulating Materials ("Lunkerites").** Karel Hybek. *Hutnik,* v. 5, no. 10, Oct. 1955, p. 291-293.

Compositions, properties and methods for using various "lunkerites" used in steel foundry and casting practice. Tables, graph. 7 ref. (D9, E22, ST)

66-D. (Czech.) **Hydrogen in Steel.** Miroslav Sicha. *Hutnik,* v. 5, no. 10, Oct. 1955, p. 302-305.

Types of charge, impurities, furnace linings, slags and other factors in which hydrogen affects properties of steel. 9 ref. (D2, D5, N15, ST)

67-D. (Polish.) **Development of Techniques in Soviet Steel Works and Rolling Mills.** Leonid Andrejew. *Wiadomosci hutnicze,* v. 11, no. 11, Nov. 1955, p. 335-341.

A progress report on engineering, techniques, production, research and other activities in the Soviet steelmaking industry during the last three years. Photographs, table. 1 ref. (D general, F23, ST)

68-D. (Swedish.) **An Investigation of Pastes Used in Söderberg Electrodes for Electric Steel Furnaces.** K. N. Cederquist. *Jernkontorets annaler,* v. 139, no. 11, 1955, p. 893-922.

Results of investigation of more than 20 pastes tested in an effort to determine reasons for explosions in furnaces, due to unsatisfactory composition of pastes, and development of a simple test method for control of pastes delivered to steel mills. Tables, diagrams, graphs. (D5, ST)

69-D. A Resume of Blast Furnace Refractories. Hobart Kraner. *Blast Furnace and Steel Plant,* v. 44, Jan. 1956, p. 55-60.

Requirements for various parts of the furnace, including hearth, bosh and stack. Graphs. (D1)

70-D. Blast Furnace Investigations of Melting and Tapping by the Use of Radioactive Isotopes. Walter Loorz and Heinz Weber. *Blast Furnace and Steel Plant,* v. 44, Jan. 1956, p.64-66, 68.

Method and results of investigation to determine action of pig iron in the hearth. Findings show that the pig iron lies in layers. Graphs. 8 ref. (D1, S19, Fe)

71-D. Automatic Selective Charging System Increases Output. *Blast Furnace and Steel Plant,* v. 44, Jan. 1956, p. 67-68.

Device equalizes flow of gases in blast furnace, thus insuring full activation of the charge. Photographs. (D1)

72-D. Electricity Now Being Employed for Hot-Topping. Frank Nicholson. *Blast Furnace and Steel Plant,* v. 44, Jan., 1956, p. 75-78.

Unit and economic advantages. Diagrams, photographs, (D9)

73-D. LD-Process of Steelmaking With Oxygen Jet. Herbert Trenkler and H. F. Hautmann. *Metal Progress,* v. 69, Jan. 1956, p.49-56.

Outlines process and describes properties of resulting steels. Economic and operational advantages cited and compared with other processes. Graphs, photographs, diagram, tables. 1 ref. (D8, ST)

74-D. The First Successful Bessemer Steel. Karl Fredrik Goransson. *Metal Progress,* v. 69, Jan. 1956, p. 85-87.

A discussion of Bessemer's equipment and set-up in Sweden, and how tuyeres were enlarged so that much more air at lower pressures could be blown through the molten pig iron. Micrograph, photographs. (D3, A2, ST)

75-D. Vacuum Remelting of Superalloys by the Consumable Electrode

Process. W. W. Dyrkacz. *Steel Horizons (Technical Section),* v. 17, Fourth Quarter 1955, 4 p.

Advantages of such remelted materials over air melting processes include lower gas content, improved cleanliness, tensile properties and high-temperature mechanical properties. Tables, photographs, micrographs, diagram. (D8, SG-h)

76-D. Production of High Boron Steel. G. D. Bagley and F. E. Bacon. *U. S. Atomic Energy Commission,* TID-5212, Sept. 1955, p. 155-156.

Results of laboratory induction furnace heats showed that 1.5% of boron can be added to steel with good recovery and without impairing its forgeability. 2 ref. (D6, ST, B)

77-D. Injection of Oxygen-Enriched Air Into Blast Furnace Hearth. Kuro Kanamori. *Henry Brutcher Translation* No. 3618 4 p. (Abstract from *Tetsuto Hagané* v. 40, no. 7, 1954, p. 665-675.) Henry Brutcher, Altadena, Calif.

Sulfur, manganese and silicon contents of blast furnace iron. Slag control and dechroming of ores containing nickel and chromium. Graphs, diagram. (D1, Fe)

78-D. Effect of Coke Circulation on Coke Consumption in Blast Furnaces. I. P. Bardin, M. Ya. Ostroukhov, L. Z. Khodak and L. M. Tsylev. *Henry Brutcher Translation No.* 3621, 20 p. (Abridged from *Izvestiya akademii nauk SSSR, OTN,* 1955, no. 1, p. 80-95.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 214-D, 1955. (D1)

79-D. Vacuum and Pressure Melting of Iron-Base Alloys. E. R. Morgan and D. N. Frey. Paper from "Vacuum Metallurgy". Electrochemical Society, Inc., p. 61-66.

Operational experiences and techniques of an alloy development group. Types of furnaces used, procedures, advantages. Diagrams, tables. (D8, Fe)

80-D. (French.) Use of Dolomite in Basic Open-Hearth Steel. W. Bading. *Centre de documentation sidérurgique, circulaire d'informations techniques,* v. 12, no. 11, 1955, p. 2039-2062.

Comprehensive review of dolomite as a refractory material for the basic purifying process and its application in practice. Tables, diagrams, photographs, micrographs, graphs. 17 ref. (D2, ST)

81-D. (French.) Problems Connected With Burning of Converter Bottoms. H. Wübbenhorst. *Centre de documentation sidérurgique circulaire d'informations techniques,* v. 12, no.11, 1955, p.2091-2106.

Factors influencing rate of burning. Obtained results permit set up of optimum conditions for operation, quality of material and methods of construction for longer life of converter bottoms. Tables, diagrams, graphs, photographs. 11 ref. (D3, ST)

82-D. (French.) Sensitivity of Converter Bottom to Cooling. P. Delong. *Centre de documentation sidérurgique, circulaire d'informations techniques,* v. 12, no. 11, 1955, p. 2107-2108.

Relationship between thickness of bottom and number of charges before relining was necessary. Tables, graph. 2 ref. (D3, ST)

83-D. (French.) Refractory Bricks for Basic Bessemer Converters. M. Lellig. *Centre de documentation sidérurgique, circulaire d'informations techniques,* v. 12, no. 11, 1955, p. 2215-2220.

Composition, physical and chemical characteristics of different types of refractory bricks. Tables. (D3, ST)

84-D. (French.) Characteristics of the Temperature Curve at the End of Dephosphorization. M. Trentini. *Centre de documentation sidérurgique, circulaire d'informations techniques,* v. 12, no, 12, 1955, p. 2379-2387; disc., p. 2387.

Discusses final temperature plateau, chemical explanations of the curve, variation of phosphorus content of the steel and total iron content of the slag as a function of temperature and of the length of the plateau. Graphs. (D general, P12, Fe, ST)

85-D. (French.) Factors That Influence the Results Furnished by the Galey Opacimeter. M. Gombert. *Centre de documentation sidérurgique, circulaire d'informations techniques,* v. 12, no. 12, 1955, p.2389-2398; disc., p. 2398-2402.

Influence of both temperature and quantity of charged lime on phosphorus content of the metal and on iron content of the slag at the moment of maximum opacity of the smoke. Tables, graphs. (D general, P12, Fe)

86-D. (Japanese.) Studies on Prevention of Coke Sulfur From Permeating Into Pig Iron. Tsunetaro Kato, Kenjiro Takeshita and Takahiro Tsutsiu. *Fuel Society of Japan, Journal,* v. 34, no. 343, Nov. 1955, p.629-632.

Sodium carbonate and/or sodium cyanide was effective as an agent for desulfurizing pig iron. Micrographs. (D1, E10, Fe)

87-D. (Russian.) **Kinetics of Iron Oxide Reduction by Gaseous Reducing Agents at Low Temperatures.** A. G. Moskvicheva and G. I. Chufarov. *Doklady akademii nauk SSSR,* v. 105, no. 3, Nov. 21, 1955, p. 510-513.

Investigation conducted with iron ores in an atmosphere of hydrogen and carbon monoxide. Graphs. 11 ref. (D general, Fe)

88-D. (Russian.) **Ferromanganese Smelting, Using Carbonate Manganese Ores From the Chiatur-Deposit.** A. Iu. Arsenishvili, S. G. Boiko, M. A. Kekelidze, V. V. Perova, B. F. Filonenko and A. N. Tsaritsyn. *Izvestiia akademii nauk SSSR, otdelenie tekhnicheskikh nauk,* 1955, no. 11, Nov., p. 5-12.

Distribution of manganese and phosphorus among melting products. Comparison of results in blast furnace, using usual charge and charges with carbonate ores. Tables. 8 ref. (D1, Fe, Mn)

89-D. Soda Ash Desulphurization. C. E. A. Shanahan. *Iron & Steel,* v. 29, Jan. 1956, p. 9-14.

Ladle process as practiced at nine British works. Most plants found the process satisfactory, but in some of the older works it was discontinued because of deleterious effect on mixer or on openhearth refractories, or because of sulfur fumes. In general, it was found to be very efficient in plants where there were adequate arrangements for skimming off the soda slag and removal of fumes. Tables, graphs. 1 ref. (D general, A8, Fe)

90-D. Desulphurization and Deoxidation of Steel Melts. W. A. Fischer and H. Engelbrecht. *Iron & Steel,* v. 29, Jan. 1956, p. 19-20, 32.

Studies using a lime + 10% calcium fluoride crucible in an induction furnace. Silicon additions were made to steels containing various amounts of carbon and rates of removal of sulfur and oxygen were determined. Graphs, table. 3 ref. (D general ST)

91-D. A Wide-Field High-Temperature Periscope. Charles Burns. *Society of Instrument Technology, Transactions,* v. 7, Dec. 1955, p. 137-146.

Water-cooled furnace - scanning periscope which gives an interior view in an openhearth furnace for visual or photographic observations. Entire furnace interior may be viewed from a single point of insertion. Diagrams, photographs. 3 ref. (D2, S18, ST)

92-D. Hot Cropping for Top Ingot Yield. *Steel,* v. 138, Jan. 30, 1956, p. 92.

Equipment and procedure for hot cropping corrugated ingots. Saves time and labor, giving maximum yield of fine products. Photograph. (D9, ST)

93-D. (French.) **Some Aspects of the Preparation of Ferro and Silicomanganese in the Electric Furnace.** *Journal du four electrique,* v. 64, no. 6, Nov.-Dec. 1955, p. 193-195.

Economic and practical advantages of electric furnace production over blast furnace production. Photograph. (D5, D1, Fe-n)

94-D. (Spanish.) **Influence of Charging Materials, Energy Carriers, and Economic Factors on the Selection of the Process for Obtaining Steel.** Ernst Krebs and Karl Heinz Schnittger. *Instituto del hierro y del acero,* v. 8, no. 39, Oct. 1955, p. 475-495.

Blast furnace, bessemer and electric steelmaking processes from above points of view. Graphs, tables. 35 ref. (D1, D3, D5, ST)

95-D. (Czech.) **Economics of Various Heat Installations.** Frantisek Vanis. *Hutnik,* v. 5, no. 8, Aug. 1955, p. 226-232.

Czech steel mills compared for consumption of heat in production of raw steel. Effect of different fuels. Blast furnace and openhearth heat consumption data. Economizing measures and automatic regulation. Rolling-mill heat consumption. Tables, graphs. 7 ref. (D1, D2, F23, ST, Fe)

96-D. (Czech.) **Composition and Calculation of Charge for 200-Ton Openhearth Furnace for Required Carbon Content in Molten Steel.** Jaroslav Becvar. *Hutnik,* v. 5, no. 8, Aug. 1955, p. 232-234.

Calculation of various components, raw iron, ore, scrap, lime, manganese and procedure in melting charge to attain desired quality of steel. Table. 4 ref. (D2, CI)

97-D. (German.) **Electric Hot-Topping of Forging Grade Steel Ingots.** Erik Johansson and Elis Helin. *Stahl und Eisen,* v. 75, no. 26, Dec. 29, 1955, p. 1755-1765.

History of hot-topping in Sweden. Application of the electric hot-topping device and experiments on 1000 tons of forging grade steel. Tables, graph, diagrams, photographs, oscillograms. (D9, ST)

98-D. Chromium Reactions in Acid and Basic Furnaces. Sam F. Carter. *American Institute of Mining and Metallurgical Engineers, Electric Furnace Steel Conference, Preprint,* 1955, 13 p.

Correlation of slag and bath compositions of two to three-ton heats

in electric furnaces for production of high-chromium steel castings. Studies of chromium losses. Tables, graphs. 5 ref. (D5, AY)

99-D. Hydrogen Control Through Flushing of Molten Steel in Electric-Arc Furnaces. L. F. Barnhardt. *American Institute of Mining and Metallurgical Engineers, Electric Furnace Steel Conference, Preprint,* 1955, 2 p.

Procedures for using dry nitrogen, argon or dry air to remove hydrogen from a gas-sensitive steel. (D5, ST)

100-D. Electric Control of Open Hearths. A. K. Bayles and D. H. Stanton. *Instruments and Automation,* v. 29, Jan. 1956, p. 86-90.

Instruments for control of furnace pressure, roof temperature, the fuel-air, oil-steam and oil-gas ratios, BTU input, furnace reversal. Diagrams, photographs. (D2, ST)

101-D. Increased Steel Production From Desiliconized Hot Metal. E. C. Wright. *Iron and Steel Engineer,* v. 33, Jan. 1956, p. 73-85; disc., p. 84-85.

Indicates that the use of a wash metal can increase production capacity at least 25% for present open-hearth installation. Analysis also shows that a desiliconized wash metal with a 2% carbon, 0.2% manganese and 0.1% silicon can practically double electric furnace output and decrease power and electrode costs by 40 to 50%. Both practices are primarily applicable at integrated steel plants where ample hot metal is available. Tables, graphs. 7 ref. (D2, D5, ST)

102-D. Silicon and Manganese Reactions in Ferromanganese Blast-Furnace Processes. E. T. Turkdogan. *Iron and Steel Institute, Journal,* v. 182, Jan. 1956, p. 74-79.

An attempt has been made to discover the factors controlling the distribution of manganese and silicon between manganese metals and slags. By making use of some laboratory experimental results, it has been possible to calculate the activity coefficient of manganous oxide in blast furnace-type slags. Graphs, tables. 9 ref. (D1, P12, Fe)

103-D. Dephosphorization of Alloys by Hydrogen. P. C. Ghosh and B. Chatterjee. *Iron and Steel Institute, Journal,* v. 182, Feb. 1956, p. 153-155.

The loss of phosphorus, on heating powdered samples of phosphor-copper, ferrophosphorus and a cast iron in hydrogen and nitrogen, both dry and wet, determined. Tables. 3 ref. (D general, C general, Cu, CI)

104-D. Automatic Stock-Level Control on Blast-Furnaces. I. Kjellman and K. Krönblad. *Iron and Steel Institute, Journal,* v. 182, Feb. 1956, p. 168-170.

Details of a new automatic stock-level controller and the favorable results obtained. Diagrams. 5 ref. (D1)

105-D. (German.) **Practical Application of the Process of Degasifying Steel Under Vacuum, Particularly for Large Forging Grade Steel Ingots.** Arthur Tix. *Stahl und Eisen,* v. 76, no. 2, Jan. 26, 1956, p. 61-68.

Describes plant and pump for casting ingots, in order to avoid occurrence of flakes and nonmetallic inclusions, and to eliminate expensive heat treatment necessary to remove hydrogen by diffusion. Effect on properties. Photographs, micrographs, diagrams, graphs, tables. 16 ref. (D8, ST)

106-D. (Polish.) **Good and Bad Maintenance of the Tap Hole.** Wladyslaw Hansel and Waclaw Dakowicz. *Wiadomosci hutnicze,* v. 11, no. 12, Dec. 1955, p. 374-378.

Proper and improper opening of the openhearth furnace tap hole. Design of hole and threshold, type, use of block. Diagrams. (D2, CI)

107-D. (Polish.) **Practical Possibilities of Rapid Heating in Openhearth Silica Roofs.** Stanislaw Pawlowski. *Wiadomosci hutnicze,* v. 11, no. 12, Dec. 1955, p. 378-380.

Defects of heating methods in use in Poland and elsewhere. New designs to heat roof or crown utilize compressed air, save on gas, and cut down time. Diagram. 1 ref. (D2)

108-D. (Russian.) **Influence of Vacuum Melting on Growth Of Cast Iron.** F. N. Tavadze and I. A. Bairamashvili. *Liteinoe proizvodstvo,* 1955, no. 12, Dec., p. 23.

Effect of dissolved gases, comparison of linear growth and weight increase of original cast iron and cast iron remelted and degasified in vacuum furnace. Nature of graphitic inclusions in both cases. Tables. micrographs, graph. 1 ref. (D8, CI)

109-D. Mothballing a Blast Furnace. F. R. Kik. *Blast Furnace and Steel Plant,* v. 44, Feb. 1956, p. 208-210, 212, 214.

Vinyl plastics were used experimentally to seal blast furnace during indefinite banking. Photographs. (D1, ST)

110-D. Automatic Control in the Steel Industry. B. O. Smith. *Institution of Chemical Engineers, Transactions,* v. 33, no. 3, 1955, p. 195-198.

Operating variables for the open-

hearth furnace and the mill reheating furnace. Automatic control of rolling mills is imminent. Diagrams. 4 ref. (D2, F23, S18, ST)

111-D. Production of High Nitrogen Steels. V. F. Zackay, E. R. Morgan and J. C. Shyne. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Feb. 1956, p. 216.

Properties and methods of manufacturing high nitrogen steels. Tables. 2 ref. (D8, D9, AY)

112-D. Oxygen Sampler Guards Open-Hearth Efficiency. *Steel,* v. 138, Feb. 20, 1956, p. 116, 119.

System for reliable measurement of oxygen content in openhearth flue gases obtains a continuous dirt-free sample with a minimum of maintenance. Fuel-air ratio is automatically adjusted for optimum combustion efficiency. Diagrams, photograph. (D2, S11)

113-D. (Czech.) Effect of Gas on the Quality of Pig Iron and Cast Iron. Vladimir Zednik and Miroslav Sicha. *Slévarenstvi,* v. 4, no. 1; *Prace Ceskoslovenského vyzkumu slévarenskeho,* v. 3, no. 27, Jan. 1956, p. 181-196.

Cause of a higher content of gases in old gray cast iron is attributed to the rapid acceptance of moisture by graphite. The critical content of hydrogen in cast iron, gas enriched with water vapor, is 5 to 10 cc. of hydrogen per 100 g. of metal. The gas content in the pig iron depends only slightly on the type and composition of the blast furnace charge. Tables, micrographs, graph, diagram. 16 ref. (D1, CI)

114-D. Open Hearth Furnace Control. E. Whitehead. *Instrument Practice,* v 10, Jan. 1956, p. 44-48; disc., p. 48-50.

Instrumentation for automatic steel furnace regulation. (D2, S16, ST)

115-D. Largest Blast Furnace. *Iron and Steel,* v. 29, Feb. 1956, p. 42-44.

This furnace with a hearth diameter of 29 ft. 9 in. is the largest blast furnace in Europe and has an iron-making capacity of more than 10,000 tons per week. Photographs, table. (D1, Fe)

116-D. Soda Ash Desulphurization. C. E. A. Shanahan. *Iron and Steel,* v. 29, Feb. 1956, p. 45-48.

Calculations of soda slag weight and results of investigations of the soda ash process at two British iron and steel works. Tables. (D1, D9, ST)

117-D. Basic Open-Hearth Steelmaking. J. Gibson. *Iron and Steel,* v. 29, Feb. 1956, p. 55-59.

Cold-metal practice of steelmaking in a British factory built and planned to work the hot metal process. Tables, diagram, graph. (D2, ST)

118-D. Economies in Making Stainless. G. W. Healy and D. C. Hilty. *Steel,* v. 138, Mar. 19, 1956, p. 102, 105, 106.

Studies on oxygen input rates provide basis for cheaper melting practices for stainless steel. Photograph, graphs, table. (D5, SS)

119-D. Vacuum Melting. *Canadian Metals,* v. 19, Feb. 1956, p. 46, 48.

The vacuum melting plant comprises a water-cooled vacuum chamber, which houses a lip-axis tilting crucible furnace, induction heated. Photograph, diagram. (D8, ST)

120-D. Vacuum Melted Metals. . . An Interim Report. II. Frank T. Chesnut. *Industrial Heating,* v. 23, Mar. 1956, p. 522 + 10 pages.

Current status and recent advances in vacuum refining technology. Table, graphs, photographs. (D8, C25)

121-D. Oxygen Blowing Rate in Stainless Steel Melting. G. W. Healy and D. C. Hilty. *Journal of Metals,* v. 8, Mar. 1956, p. 325-327.

Temperature attained during the oxygen blow results from excess heat input over heat losses; an evaluation of the heat balance of the oxidizing period has been made. Graphs. 5 ref. (D5, SS)

122-D. Rate of FeO Reduction From a CaO-SiO_2-Al_2O_3 Slag by Carbon-Saturated Iron. W. O. Philbrook and L. D. Kirkbride. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Mar. 1956, p. 351-356.

The reduction of FeO from blast furnace-type slags containing less than 5% FeO and melted over carbon-saturated iron in stationary graphite crucibles, and the part played by FeO reduction in the mechanism of desulphurization of iron by slags. Tables, graphs. 12 ref. (D1, Fe)

123-D. (Czech.) Should One Build Completely Basic Openhearth Furnaces? Oldrich Bohus. *Hutnik,* v. 5, no. 11, Nov. 1955, p. 323-325.

Economic and operational data from industry proves that openhearths, lined entirely with basic refractories, are efficient and worth

constructing. Factors include types and efficiency of fuels and refractories used, types of roof or crown heating, and cooling and service-life of crowns. Tables. (D2)

124-D. (Czech.) **Determining the Properties of Slags From a Basic Openhearth Furnace by Their Appearance: Importance of Determining the Progress of the Melting Process.** Jaroslav Becvar. *Hutnik,* v. 5, no. 11, Nov. 1955, p. 325-328.

Rapid inspection method for checking proper degree of basicity and content of metallic oxides of slag samples to guarantee good-quality steel. Photographs. (D2, B21, ST)

125-D. (French.) **General Review of Ferrous Metal Horizontal or Oblique Continuous Casting Processes.** A. Bungeroth. *Centre de Documentation Sidérurgique, Circulaire d'Informations Techniques,* v. 13, no. 1, 1956, p. 89-124.

Process of solidification of continuously cast steel. Effects of length of ingot mold and casting speed. Hourly production of an installation, capacity of furnaces and control of casting speed. Diagrams, graphs, tables. 22 ref. (D9, ST)

126-D. (French.) **Behavior of Different Types of Furnace Bottoms During Blasting.** M. Demarteau. *Centre de Documentation Sidérurgique, Circulaire d'Informations Techniques,* v. 13, no. 1, 1956, p. 147-155.

Study of flow-pressure curves for different types of bessemer converter bottoms. Effects of various tuyeres, tubes, and spindles. Graphs. (D3, ST)

127-D. (French.) **Industrial Results Obtained With Converters Having Cylindrical Sections, Low Bath Height, and Large-Diameter Bottoms.** M. Gombert and J. de Hedouville. *Centre de Documentation Sidérurgique, Circulaire d'Informations Techniques,* v. 13, no. 1, 1956, p. 157-168.

Influence of factors determining the blasting ability of charges in three basic bessemer converters of 13, 19 and 30-ton capacity. Diagrams, table. 4 ref. (D3, ST)

128-D. (French.) **Induction Melting Furnace at the Bofors Steel Works.** T. Hahn. *Métallurgie et la construction mécanique,* v. 88, no. 1, Jan. 1956, p. 31, 33-34.

Construction and electrical equipment of the 12-ton high-frequency furnaces at steel works in Sweden. Annual production is about 21,000 tons of steel. Photographs, diagram. (D6, ST)

129-D. (Italian.) **Recent Progress in Steelmaking Technology.** Mario Signora. *Fonderia,* v. 5, no. 1, Jan. 1956, p. 33-41.

Iron production in blast and low-shaft furnaces; use of oxygen in the production of basic bessemer steel; new control instruments in openhearth furnaces; progress in cold rolling; development of extrusion. Diagrams, table, graph. (D general, F23, F24, ST)

130-D. (Polish.) **Regulation of the Blast Furnace Process.** Wladyslaw Kuczewski. *Hutnik,* v. 22, no. 10, Oct. 1955, p. 358-362.

Describes steps in a perfect reduction process, gives various troubles and deviations encountered in practice. Causes and corrective procedures for accumulation on shaft walls. Effect of variations in composition of charge on slag-metal reactions. Table, diagrams. 7 ref. (D1, Fe)

131-D. (Polish.) **Melting of Chromium-Containing Steel, for Castings, in the Basic Openhearth Furnace, With Full Recovery of Chromium From the Charge.** Tadeusz Mazanek and Wladystaw Hansel. *Hutnik,* v. 22, no. 11, Nov. 1955, p. 405-408.

Polish and foreign experiments in the recovery of chromium from the scrap of chromium steels remelted in basic openhearths. Factors affecting recovery include furnace temperature, quantity of slag, amount of iron oxide in the slag. Graphs, table. 2 ref. (D2, A8, CI, Cr)

132-D. (Russian.) **Improvements in the Technology of Melting Bessemer Pig Iron.** I. G. Polovchenko. *Stal',* v. 16, no. 1, Jan. 1956, p. 7-15.

Research and practice from 1949 to 1955, using Krivoi-Rog ores and agglomerates, with Donets coke as the fuel. Operational details including blowing and charging. Variations in slag and pig iron compositions. Tables. (D3, ST)

133-D. (Russian.) **Study of the Conversion of Phosphorus Pig Iron, Using Radioactive Isotopes.** V. V. Leporskii, A. I. Osipov, M. T. Bul'skii, A. G. Alimov, F. F. Sviridenko, A. M. Skrebtsov and P. N. Slepkanev. *Stal',* v. 16, no. 1, Jan. 1956, p. 19-22.

Openhearth conversion of phosphorus pig iron. Relation between phosphorus content in molten metal and rate of emergence of residual slag in the initial melting period. Graphs, tables. (D2, Fe, ST)

134-D. (Russian.) **Relation Between Microstructure of Slag and Desulfurization of Steel.** T. Sh. Askendarian and A. S. Bertsinskaia. *Stal'*, v. 16, no. 1, Jan. 1956, p. 22-29.

By studying slag microstructure, it is possible to determine its basicity, approximate magnesium content and ability to desulfurize the open-hearth bath. Desulfurization during pure boil period and effect of lime addition and other factors in this period. Tables, micrographs, graph. 5 ref. (D2, ST)

135-D. (Russian.) **Problem of the Manufacture of Electric Steel by the Duplex Process.** O. A. Mikhailov. *Stal'*, v. 16, no. 1, Jan. 1956, p. 29-32.

Use of oxygen-blown converter and electric furnace. Acid and basic converters compared. Quality of steel made by the duplex process compares favorably with open-hearth steel. Table. 15 ref. (D7, ST)

136-D. (Russian.) **Study of the Continuous Casting Process for Steel.** V. S. Rutes, N. A. Nikolaev, D. P. Evteev, and V. P. Druzhinin. *Stal'*, v. 16, no. 1, Jan. 1956, p. 62-66.

Use of radio-active isotopes and measurement of temperatures within the casting make it possible to determine depth of the liquid phase, location of the crystallization front and the average rate of solidification. Graphs, tables. 8 ref. (D9, ST)

137-D. (Russian.) **Kinetics of Transfer of Sulfur From Pig Iron Into Slag of System CaO-Al_2O_3.** O. V. Travin and L. A. Shvartsman. *Zhurnal fizicheskoi khimii*, v. 29, no. 11, Nov. 1955, p. 2031-2041.

Rate of desulfurization of pig iron by slag at various temperatures depending on concentrations in the metal of sulfur, silicon and manganese. Graphs, tables, photograph. 17 ref. (D general, Fe)

138-D. (Spanish.) **Progress in Electric Steelmaking.** Hermann Walde. *Instituto del hierro y del acéro*, v. 8, no. 41, Oct.-Dec. 1955, p. 719-728.

Study of thermal balance and decisive factors in the specific consumption of energy in the electric furnace; advantages of electric steelmaking; behavior of different coals in the electric reduction furnace; duplex process. Diagrams, table, graphs, photographs. (D5, ST)

139-D. Deoxidizers and Tapping Temperatures. H. M. Parker. Part of Preprint Session on Melting of Stainless Steel. *American Institute of Mining and Metallurgical Engineers, Electric Furnace Steel Conference, Preprint*, 1955, p. 27-28.

Shop practices regarding tapping temperature and deoxidation. (D5, D9, SS)

140-D. Effect of Medium and High-Carbon Ferrochromium in the Charge on Stainless Melting Practice. L. G. Cotton, Jr. *American Institute of Mining and Metallurgical Engineers, Electric Furnace Steel Conference, Preprint*, 1955, 4 p.

Melting practice summarized; effects of ferrochromium additions. Tables. (D5, B22, SS, Ni, Cr)

141-D. Effect of Nitrogen on the Solidity of Medium-Carbon and Low-Alloy Steel Castings. John H. Fuqua. *American Institute of Mining and Metallurgical Engineers, Electric Furnace Steel Conference, Preprint*, 1955, 8 p.

Steels produced under conditions ideal for nitrogen absorption investigated as to composition and physical properties. Graphs, tables. (D5, CI, Ti, Al)

142-D. An Efficient Method of Desulphurizing Liquid Pig Iron. B. Trentini, L. Wahl and M. Allard. *American Institute of Mining Metallurgical and Petroleum Engineers, Preprint*, 1956, Feb., 9 p.

A rapid, efficient method characterized by intimate contact between metal bath and lime powder blown in through immersed tuyeres. Photographs, graphs, tables. 16 ref. (D3, CI)

143-D. Gas Purging of the Molten Bath in the Electric Arc Furnace. Adam J. Texter. *American Institute of Mining and Metallurgical Engineers, Electric Furnace Steel Conference, Preprint*, 1955, 4 p.

Use of oxygen, dried compressor air and fluorine to purge molten metal. Diagram, photographs. (D5, ST)

144-D. Melting Stainless Steel. Richard B. Shaw. Part of Preprint Session on Melting of Stainless Steel. *American Institute of Mining and Metallurgical Engineers, Electric Furnace Steel Conference, Preprint*, 1955, p. 1-15.

Brief survey of melting practices. Tables, graphs. 11 ref. (D5, SS)

145-D. Melting Stainless Steel. *American Institute of Mining and Metallurgical Engineers, Electric Furnace Steel Conference, Preprint*, 1955, 30 p.

Seven papers, separately abstracted, on various aspects of the melting process. (D5, SS)

146-D. The Melting of Stainless Steel—The Reducing Period. L. F. Weitzenkorn. Part of Preprint Session on Melting of Stainless Steel. *American Institute of Mining and Metallurgical Engineers, Electric Furnace Steel Conference, Preprint,* 1955, p. 19-20.

Carbon, metal and slag tests; addition of lime and ferrosilicon; slag removal. (D5, SS)

147-D. Monolithic and Shaped Refractories for the Electric Furnace Roof. H. G. Hart and F. H. Fanning. *American Institute of Mining and Metallurgical Engineers, Electric Furnace Steel Conference, Preprint,* 1955, 8 p.

Factors in the use of shaped and monolithic refractories. Types of brick and their advantages. Diagrams. (D5, Si)

148-D. New Control Instruments for Bessemer Steelmaking. P. Leroy. *American Institute of Mining Metallurgical and Petroleum Engineers, Preprint,* 1956, Feb. 1956, 11 p.

The volume-debitgraphe, two-color pyrometer, flame pyrometer and opacimeter were developed to supply efficient research tools and closer control of blowing and thermal conditions in daily production work. Photographs, graphs, diagrams. 8 ref. (D3, S16, ST)

149-D. On the Basic Pneumatic Processes of Steelmaking. P. Coheur and H. Kosmider. *American Institute of Mining Metallurgical and Petroleum Engineers, Preprint,* 1956, Feb., 12 p.

The basic bessemer process and its present state of development. Mechanical properties of steel made by pneumatic processes. Tables, graphs, diagrams. 62 ref. (D3, Q general, ST)

150-D. Quality Control of Melting Practices. H. H. Johnson and G. A. Fisher. *American Institute of Mining and Metallurgical Engineers, Electric Furnace Steel Conference, Preprint,* 1955, 15 p.

Examples of operation and quality controls used in a mechanized melting shop. Graphs, tables. (D5, ST)

151-D. Scrap Charges for 430 Grade Stainless. Anthony J. Mimeth. Part of Preprint Session on Melting of Stainless Steel. *American Institute of Mining and Metallurgical Engineers, Electric Furnace Steel Conference, Preprint,* 1955, p. 17.

Standard charging practice followed in a steel plant. (D5, B22, SS)

152-D. Slag-Reducing Agents in the Making of Stainless Steel. Benjamin H. Brown. Part of Preprint Session on Melting of Stainless Steel. *American Institute of Mining and Metallurgical Engineers, Electric Furnace Steel Conference, Preprint,* 1955, p. 21-22.

Outlines ferrochromium-silicon reducing process which includes recovery of chromium, preparing metal for sampling, requirements for good practice, and a summary of charge materials and additions. Table, diagrams. (D5, SS, Cr, Si)

153-D. Slag Reduction in the Melting of Stainless Steel. D. J. Carney. Part of Preprint Session on Melting of Stainless Steel. *American Institute of Mining and Metallurgical Engineers, Electric Furnace Steel Conference, Preprint,* 1955, p. 23-26.

Some factors affecting reduction of chromium, manganese and iron from slags. 3 ref. (D5, SS)

154-D. Oxygen Converter Process. George B. McMeans. *American Iron and Steel Institute, Preprint,* 1955, 7 p.

Plant, equipment, process, advantages, economic factors. (D8, ST)

155-D. The Oxygen Steelmaking Process. D. O. Davis. *American Iron and Steel Institute, Preprint,* 1955, 17 p.

Plant layout, equipment and operations of steelmaking plant at Dominion Foundries and Steel Ltd. Advantages of method. Photographs, diagrams, graph. (D8, ST)

156-D. Steelmaking Developments During the Past Decade. Karl L. Fetters. *American Iron and Steel Institute, Preprint,* 1955, 12 p.

Comparison of production figures, innovations which have helped in speeding steel production, future requirements, possible new processes to replace openhearth. Graphs, table. (D general, ST)

157-D. Residual Metals in Open Hearth Steel, 1954. John D. Sullivan. *National Open Hearth Committee of the Iron and Steel Division of the A.I.M.E., Proceedings,* v. 38, 1955, p. 130-134; disc., p. 134-139.

Current status of residual elements commonly found in refined basic openhearth steel; use of scrap in furnaces. Tables, graphs. 10 ref. (D2, ST)

158-D. Desulphurization of Steel by Soda Ash Treatment. N. J. Wadia, V. G. Paranjpe and S. Visvanathan. *Tisco,* v. 3, Jan. 1956, p. 1-4.

Experiments on the desulfurization of melts of low-carbon and high-silicon steels with soda ash;

effects of varying degrees of prior deoxidation; review of earlier work and comparison with present results. Graphs, tables. 11 ref. (D9, AY, CN)

159-D. Influence of Mechanical Handling of Metallurgical Coke Upon Coke Quality. B. Kalinowski, A. Grossman and F. Janta. *Henry Brutcher Translation No.* 3613, 7 p. (From *Hutnik*, v. 21, no. 10, 1954, p. 324-326.) Henry Brutcher, Altadena, Calif.

Ways of improving transportation and screening practices to get coke of maximum uniformity. Tables. (D1, A5)

160-D. Definition of Combustion in Front of the Tuyeres of Blast Furnaces. W. Kuczewski. *Henry Brutcher Translation No.* 3663, 4 p. (From *Hutnik*, v. 21, no. 4, 1954, p. 100-102.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 323-D, 1954. (D1)

161-D. (German.) **Development and Blowing Properties of a Small Basic Converter.** Wilhelm Anton Fischer and Manfred Wahlster. *Archiv für das Eisenhüttenwesen,* v. 27, no. 2, Feb. 1956, p. 77-84.

Conversion of a 30-kg. graphite-electrode furnace into a basic test-converter. Lining and floor durabilities. Refining with regular and an oxygen-containing blast. Comparison of 2 and —25t converter melting. Shifting of dephosphorization and its effect on nitrogen absorption. Tables, graphs, diagram, photographs. 12 ref (D3)

162-D. (German.) **Development of an Electric Arc Furnace and Control of Its Electrodes.** Albert Driller. *Elektrotechnische Zeitschrift,* v. 8, no. 2, Ausgabe B, Feb. 1956, p. 41-47.

Construction, operation and evaluation of a 120-ton electric furnace with hydraulic electrode adjustment. Graphs, diagrams, photographs. (D5)

163-D. (German.) **A New Hearth Design for an Open-Hearth Furnace.** Franz Bartu and Edgard Boelens. *Stahl und Eisen,* v. 76, no. 3, Feb. 9, 1956, p. 152-158; disc., p. 158.

Novel trials to give the front and back wall of an openhearth furnace a slope against the bath and not away from it, as is customary. Smaller span and increased life of the roof. Diagrams, graphs, photograph, table. (D2)

164-D. (Russian.) **Improvement of 18XhGT Steel Production Technology.** G. M. Borodulin, V. P. Frantsov, S. Z. Iudovich and G. F. Morenko. *Stal',* v. 16, no. 2, Feb. 1956, p. 135-139.

Microstructure and ingot surface improvements result from changes in method of teeming and lubrication of molds. Tables, graph, diagram, photographs, micrographs. (D9, M27, N12, ST)

165-D. (Book.) **National Open Hearth Committee of the Iron and Steel Division of the A.I.M.E., Proceedings (Annual Volume),** v. 38, 1955, 298 p. American Institute of Mining and Metallurgical Engineers, 29 West 39th Street, New York 18, N. Y.

Collection of 37 papers on various aspects of openhearth practice. Includes basic and acid operation, refractories and masonry, operating metallurgy and cold metal and basic foundry practice, and combustion. (D2, Fe, ST)

166-D. Fifty Years of Progress in Electric Furnace Steelmaking. Howard J. Stagg. *Metal Progress,* v. 69, Apr. 1956, p. 49-54.

Fifty years ago the first electric arc steelmaking furnace in America started production of toolsteels in competition with crucible furnaces. It has since made the crucible method obsolete and now, in many instances, produces steel at lower cost than openhearth furnaces. Photographs, tables. (D5, TS, AY)

167-D. Fifty Years of Progress in Arc-Furnace Electrodes. F. B. O'Mara. *Metal Progress,* v. 69, Apr. 1956, p. 81-88.

Arc-furnace steelmaking would be impossible without carbon and graphite electrodes. At each stage of advance in furnace design, electrodes of the necessary size and quality have been available. Photographs. 6 ref. (D5, C)

168-D. Bismuth Additions to Steel. (Digest of "Experiment of Adding Metallic Bismuth to Liquid Steel", by V. S. Bozhko; *Trudy Instituta Chernoi Metalurgii",* v. 7, 1953, p. 54-56.) *Metal Progress,* v. 69, Apr. 1956, p. 132.

The effect of additions of granular bismuth studied both in the laboratory and in commercial practice. There was no significant effect of bismuth additions on the properties of the final steel bars, and it was impossible to find any trace of residual bismuth in the steel, even with a spectroscope. (D8, Q general, ST, Bi)

169-D. Electrics Move Ahead. *Steel,* v. 138, Apr. 9, 1956, p. 120, 122-123, 125.

Reviews electric steel production and future expansion. Graph, photographs. (D5, ST)

170-D. Sulzer Axial Blowers for Furnace Blast. E. Aguet. *Sulzer Technical Review,* v. 37, no. 3, 1955, p. 1-18.

Excellent efficiency, high reliability in service and marked adaptability of the Sulzer axial blower leads the field of regulation, where new solutions are found to the problems raised by various types of drive. Diagrams, graph, photographs. (D1)

171-D. Nation's Largest Vacuum Melting Furnace. James H. Moore. *Western Machinery and Steel World,* v. 47, Apr. 1956, p. 126-128.

A new high-vacuum induction melting furnace, its operation, benefits and applications. Diagram, photographs. 3 ref. (D8, C25)

172-D. High Percent Ferrosilicon of Increased Stability. T. P. Khazanova and Yu. P. Vasin. *Henry Brutcher Translation No.* 3637, 14 p. (From *Stal,* v. 15, no. 8, 1955, p. 720-727.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 333-D, 1955. (D9, F29, Fe)

173-D. Production-Scale Trials of Large All-Basic Open-Hearth Furnaces. V. O. Kulikov, I. I. Bornatskii and A. P. Yargin. *Henry Brutcher Translation No.* 3643, 12 p. (From *Stal,* v. 15, no. 9, 1955, p. 801-806.) Henry Brutcher, Altadena, Calif.

Data on the results obtained by a change from silica to basic (chrome-magnesite) roofs in 390-net ton openhearth furnaces over several campaigns. Tables, photographs. 2 ref. (D2, ST)

174-D. Ore Versus Mill Scale for Elimination of Carbon From Steel Baths. E. Plettinger. *Henry Brutcher Translation No.* 3664, 12 p. (From *Radex Rundschau,* no. 3-4, 1955, p. 409-417.) Henry Brutcher, Altadena, Calif.

Comparative study of effects of additions of ore and mill scale to the slag in openhearth and arc furnaces to promote carbon elimination. Erroneous assumptions currently held in regard to physicochemical relationship between reaction of carbon and the oxides of iron and manganese. (D2, D5, ST)

175-D. Phase Transformations in Blast Furnaces. I. P. Bardin, A. V. Rudneva and L. M. Tsylev. *Henry Brutcher Translation No.* 3671, 8 p. (From *Izvestiya Akademii Nauk SSSR, OTN,* no. 5, 1955, p. 123-128.) Henry Brutcher, Altadena, Calif.

Study of the successive transformations and state of aggregation of the burden materials in a blast furnace, of the conditions under which slag is formed and of the phase composition of the primary slag along the furnace height for basic iron, ferrosilicon, and ferromanganese. Diagrams. (D1, Fe)

176-D. (Czech.) **On Carburization of Liquid Steel With Coke in the Ladle.** Lubomir Smrha. *Hutnické Listy,* v. 11, no. 3, Mar. 1956, p. 143-148.

Influence of carburizing steel with coke in the ladle on quality and yield of steel. The gas content of the metal was roughly proportional to the degree of carburization. Tables, photographs. 17 ref. (D9, CN)

177-D. (Czech.) **Production of Iron With Reduced Manganese Content.** Antonin Bichler. *Hutnické Listy,* v. 11, no. 3, Mar. 1956, p. 143-148.

Production of low-manganese pig iron results in savings in coke consumption and economics in making the finished steel. (D1, D2, Fe)

178-D. (German.) **Effect of Oxygen Addition to Air Blast on Gradation of Grain Sizes in Thomas Converter and Electric Arc Furnace Exhaust Gases.** Robert Meldau and Diethelm Laufhütte. *Archiv für das Eisenhüttenwesen,* v. 27, no. 3, Mar. 1956, p. 149-152.

Grain size and distribution, amount of brown smoke, sampling, comparison of normal and oxygen melts, types of iron oxides. Tables, micrographs. 9 ref. (D3, D5, ST)

179-D. (German.) **The Development of the Low-Shaft Blast Furnace Process in the German Democratic Republic.** K. Säuberlich. *Neue Hütte,* v. 1, no. 4, Feb. 1956, p. 193-201.

Application of the low-shaft blast furnace process in Germany. Metallurgical and operating characteristics; further refinements. Tables, diagram, photographs. 2 ref. (D1, ST)

180-D. (German.) **Structural Characteristics of the Low-Shaft Blast Furnaces in the German Democratic Republic.** R. Baake. *Neue Hütte,* v. 1, no. 4, Feb. 1956, p. 202-213; disc., p 213-215.

Design and operation and construction details. Graphs, diagrams. 11 ref. (D1, ST)

181-D. (German.) **Operational Experiences With Low-Shaft Blast Furnaces in the German Democratic Republic.** Hans-Joachim Lux. *Neue Hütte,* v. 1, no. 4, Feb. 1956, p. 216-225.

Service conditions and development of production in the West Iron

Works at Calbe (Saale). Operational details. Graphs, photographs. (D1, A5, ST)

182-D. (German.) **Desphosphorizing Basic Converter Steels.** Karl Gorg Speith and Hans vom Ende. *Stahl und Eisen,* v. 76, no. 6, Mar. 22, 1956, p. 323-329; disc., p. 329-331.

Dephosphorization obtained by the addition of fine dephosphorizing agents; temperature losses and afterblow times; possibilities of dephosphorizing by afterblowing with the slag remaining after slagging-off; relations between the final phosphorus content, the iron content of the slag and the temperature; changes in manganese and oxygen content. Graphs, table. (D3, ST)

183-D. (Portuguese.) **Possibilities of Using Hydrogen in the Reduction of Brazilian Powdered Ores.** Janusz Wscieklica. *ABM (Boletim da Associacgo Brasileria de Metais),* v. 11, no. 41, Oct. 1955, p. 389-409.

Advantages or hydrogen reduction; comparison between carbon monoxide and hydrogen as reducing agents; factors affecting reduction time, including reduction temperature and granulometric factor. Graphs, tables, micrographs, diagrams. 23 ref. (D8, Fe)

184-D. Degasifying Steel Under Vacuum. Practice for Large Forging Steel Ingots. Arthur Tix. (From *Stahl und Eisen,* v. 76, no. 2, Jan. 26, 1956, p. 61-68.) *Iron & Steel,* v. 29, Mar. 1956, p. 81-86.

Previously abstracted from original. See item 105-D, 1956. (D8, ST)

185-D. Coreless Induction Furnace. II. K. Scherzer and F. S. Leigh. *Iron and Steel,* v. 29, Mar. 1956, p. 105-108; disc., p. 108-111.

Even considering the limits of application of this type of furnace compared with frequency induction furnace, the coreless type is preferred, owing to lower initial cost. Diagram, graphs, photographs. (D6)

186-D. (French.) **Remarks on the Design of Ingot Molds. Square Ingot Molds for Electric Steel Plants. Flat Ingot Molds for Openhearth Steel Plants.** J. Duflot. *Centre de Documentation Sidérurgique, Circulaire d'Informations Techniques,* v. 13, no. 3, 1956, p. 569-603.

Relationship of ingot mold design to consumption of cast iron per ton of ingot. Graphs, tables. 14 ref. (D9, CI, ST)

187-D. (German.) **A New Method of Electrode Adjustment With Magnetic Amplifiers.** Wilhelm Kafka. *Stahl und Eisen,* v. 76, no. 7, Apr. 5, 1956, p. 381-390.

General remarks on magnetic amplifiers. Design of adjusting equipment and control characteristics in its application to steel melting and reduction furnaces. Diagrams, graphs, photographs. (D5, ST)

188-D. (German.) **Relations Between the Phosphorus Content of Basic Converter Heats, the Iron Content of the Slag and the Amount of Oxygen Offered During the Last Minutes of Blowing.** Hans von Ende and Gustav Mahn. *Stahl und Eisen,* v. 76, no. 7, Apr. 5, 1956, p. 390-393.

Effect of iron content of the slag and temperature on the phosphorus content of the steel. Oxygen consumption and iron slagging. Oxygen consumption and loss of phosphorus in melting. Graphs. (D3, B21, ST, Fe)

189-D. (Russian.) **Converter Refining of Openhearth Steel by Means of Pure Oxygen.** *Stal',* v. 16, no. 3, Mar. 1956, p. 203-212.

Transformation of basic converter into an oxygen converter. Oxygen process provides carbon steels similar to Martin steels without addition of fluorspar and with very economical results. Tables, diagrams, graphs. 2 ref. (D8, CN)

190-D. (Russian.) **Oxidation of Liquid Steel During and After Teeming From Openhearth Furnace.** *Stal',* v. 16, no. 3, Mar. 1956, p. 214-216.

Study of shape and condition of tap hole and its effect on teeming time, character of flow, and on oxidation of the metal and inclusions in the final product. Tables. (D9, S18, ST)

191-D. (Spanish.) **Low-Temperature Reduction of Iron Ores and the Concentration of Iron Sponge.** Jacques Astier. *Instituto del Hierro y del Acero,* v. 9, no. 43, Feb. 1956, p. 109-117.

Compares methods for processing lean ores. Use of rotating furnace, crucibles, possible elimination of blast furnace, possible use of electric and other furnaces. Magnetic roasting and magnetic separation. Applicability of low-temperature methods is restricted by structure of ore. Tables, graphs. 7 ref. (D8, B15, Fe)

192-D. (Swedish.) **Reduction Experiments on Steep Rock Ore.** John Olof Edström *Jernkontorets Annaler,* v. 140, no. 2, 1956, p. 130-136.

Microscopic and X-ray refraction studies show that this iron ore has a high reducibility and shows promise for the production of sponge

iron. Table, micrographs, graph. 7 ref. (D8, Fe)

193-D. (Russian.) **Continuous Casting of Steel.** M. S. Boichenko and V. S. Rutes. *Liteinoe Proizvodstvo,* 1956, no. 3, Mar. 1956, p. 1-4.

Direction of crystallization process in continuous casting of steel and nonferrous metals and its effect on mechanical properties of the product; compares continuous casting techniques in the U.S.S.R. and abroad. Diagrams, photographs, table. (D9, C5, N12, Q general, ST)

194-D. Production and Use of Iron Coke. Charles C. Russell, P. Whitstone and R. P. Liggett. *Blast Furnace, Coke Oven and Raw Materials Committee of the Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, Proceedings,* v. 14, 1955, p. 93-119; disc., p. 119-122.

Development of process for combining iron oxides and coal for coking, production problems, results obtained from use in blast furnace. Photographs, micrograph, tables, graphs. 17 ref. (D1, B16, B18, Fe)

195-D. Use of Open Hearth Slag in Blast Furnaces, and Effect on Open Hearth Practices. E. B. Speer. *Blast Furnace, Coke Oven and Raw Materials Committee of the Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, Proceedings,* v. 14, 1955, p. 181-185; disc., p. 186-202.

Process for producing a more economical basic hot metal, which is as consistent in chemical analysis and physical temperature as that produced by the conventional blast furnace burden with little or no open-hearth slag. Table, graphs. (D1, D2, Fe)

196-D. A Report on Solid Movement in Blast Furnace Models. J. B. Wagstaff. *Blast Furnace, Coke Oven and Raw Materials Committee of the Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, Proceedings,* v. 14, 1955, p. 298-320; disc., p. 320-325.

Movement of the stock column was investigated using a thin slice model and a semicircular one. Graph, diagram, photographs. 11 ref. (D1, Fe)

197-D. Rate of Reduction of Iron Oxide From a Blast-Furnace Type Slag by Liquid Iron in Carbon Crucibles. W. O. Philbrook and L. D. Kirkbride. *Blast Furnace, Coke Oven and Raw Materials Committee of the Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, Proceedings,* v. 14, 1955, p. 326-335; disc., p. 335-338.

Reaction rates measured for a reduction of iron oxide from a lime-silica-alumina slag over carbon-saturated iron in graphite crucibles. Tables, graphs. 9 ref. (D1, P12, Fe)

198-D. Rate of Sulphur Transfer Between Blast-Furnace Type Metal and Slag. S. Ramachandran, T. B. King and N. J. Grant. *Blast Furnace, Coke Oven and Raw Materials Committee of the Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, Proceedings,* v. 14, 1955, p. 338-349.

Previous laboratory work; an apparatus which combines conventional sampling techniques with automatic measurement of carbon monoxide evolution as a measure of the rate of desulfurization; some preliminary results. Diagrams, tables, grapns. 13 ref. (D1, Fe)

199-D. Rate of Desulphurization of Iron by Blast-Furnace Type Slags. W. O. Philbrook and G. Derge. *Blast Furnace, Coke Oven and Raw Materials Committee of the Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, Proceedings,* v. 14, 1955, p. 350-362, disc., p. 362-363.

Kinetics and mechanism of desulfurization. Graphs. 10 ref. (D1, Fe)

200-D. Versatile Melting Equipment for Alloy Development. L. M. Bianchi and A. J. Schulte. *Metal Progress,* v. 69, May 1956, p. 73-76.

Can produce heats ranging from laboratory size for preliminary investigation to production sizes for full-scale testing. Photograph. (D general, E10)

201-D. (German.) **Noise Measurement for Control of Blow in Purifying Process. II.** J. Klärding and F. R. Licht. *Metall,* v. 10, Nov. 9-10, May 1956, p. 405-415.

Origin of noises in a converter, effect of converter mouth on the noise intensity, expression of blow conditions in a noise graph, relation between decarbonization and the ratio of noise intensity. Interpretation of metallurgical processes from a noise graph. Table, graphs. 9 ref. (D3, ST)

202-D. (German.) **On the Development of the Vertical Continuous Casting Process for Steel.** Karl Georg Speith and Adolf Bungeroth. *Stahl und Eisen,* v. 76, no. 8, Apr. 19, 1956, p. 437-442.

Fundamental conditions encountered in the casting of steel. Continuous casting from holding furnaces and from ladles. Continuous casting with increased receiving ca-

pacities of the mold. Simultaneous casting of more than one bar. Prevention of accidents. Diagrams, graphs. 16 ref. (D9, ST)

203-D. (Japanese.) **On Oxidation Degree, Reduction Degree and Reducibility of Iron Ore.** Shigeichi Sasaki and Haruo Adachi. *Iron and Steel Institute of Japan, Journal,* v. 41, no. 4, Apr. 1956, p. 399-407.

Methods for indicating degree of oxidation and reduction, tests involving the factors influencing reducibility. Tables, graphs. 11 ref. (D general, Fe)

204-D. (Russian.) **Use of Water-Cooled Metal Chills for Flux Melting in Electric Furnaces.** B. E. Paton, O. S. Zabarilo and V. G. Ubel'. *Avtomaticheskaia, Svarka,* v. 9, no. 1, Jan.-Feb. 1956, p. 65-69.

Use of water-cooled metal chills saves furnace lining from extra wear and protects the melted flux from contamination with the products of disintegration of the lining. The influence of the lining on chemical composition of the flux is also reduced. Diagrams, tables. (D5, ST)

205-D. (Russian.) **Oxygen in Steel Poured From the Bottom.** V. A. Mchedlishvili and A. M. Samarin. *Izvestiia Akademii Nauk SSSR- Otdelenie Tekhnicheskikh Nauk,* no. 3, Mar. 1956, p. 106-110.

The lowering of oxygen content in steel due to the flotation of nonmetallic impurities in the process of bottom pouring. Photographs, table. 7 ref. (D9, ST)

206-D. (Russian.) **Use of Oxygen for Raising the Efficiency of Openhearth Furnaces.** A. V. Leskov. *Metallurg,* no. 1, Jan. 1956, p. 7-9.

Problems of using oxygen for quick smelting in openhearth furnaces. Economies of the method. Diagrams, graph. (D2, ST)

207-D. (Russian.) **Smelting of Stainless Steel in Oxygen Blast.** N. I. Shutkin. *Metallurg,* no. 1, Jan. 1956, p. 10-11.

Advantages of using oxygen blast in smelting stainless steel: fuller utilization of scrap, lower carbon content in the product, higher efficiency of the electric furnaces due to shorter smelting periods. Diagram, table, graph. (D5, SS)

208-D. (Russian.) **Development of the Continuous Steel Casting Process.** M. S. Boichenko, V. S. Rutes and V. V. Ful'makht. *Metallurg,* no. 2, Feb. 1956, p. 7-11 + 1 color plate.

Comparative research study of various aspects of continuous casting; advantages of vertical casting on subsurface level; experimental installations at two metallurgical plants employing a sprayer-type secondary cooling system; references to metallurgical practices abroad. Diagrams, photographs. (D9, ST)

209-D. (Russian.) **Raising the Economic and Productive Efficiency of Openhearth Furnaces by Installation of Waste-Heat Boilers and Evaporation Cooling Systems.** I. I. Bruk. *Metallurg,* no. 2, Feb. 1956, p. 17-22.

Heat-saving characteristics of waste-heat boilers and of evaporation-cooling systems in openhearth furnaces. A complex installation for simultaneous utilization of heat from flue gases and from furnace elements subjected to cooling. Diagrams, table. (D2, ST)

210-D. (Russian.) **Industrial Experience With Manufacturing E320 Transformer Steel.** G. M. Borodulin, G. F. Morenko and V. P. Frantsov. *Metallurg,* no. 3, Mar. 1956, p. 14-16.

A technological process of refining transformer steel in basic electric-arc furnaces; peculiarities of the method. Table. (D5, ST)

211-D. (Russian.) **Improvement in Smelting of Bessemer Cast Iron.** V. D. Kichko. *Metallurg,* no. 3, Mar. 1956, p. 25-28.

Influence of the gas permeability of the charge on operation of the blast furnace; methods of controlling flow of gases in the furnace. Diagram, graphs. (D1, D3, CI)

212-D. (Russian.) **Experimental Speed Melting of Steel From Phosphorus Cast Irons.** F. F. Sviridenko, B. A. Sharov and L. G. Fetisov. *Metallurg,* no. 3, Mar. 1956, p. 28-32.

Advantages of refining phosphorus cast iron under intensified thermal conditions. Table. (D general, ST)

213-D. (Russian.) **Bottom Repair in High-Capacity Openhearth Furnaces.** M. M. Privalov. *Metallurg,* no. 2, Feb. 1956, p. 30-33.

Procedures in repair work on bottoms of furnaces; maintenance requirements reducing wear on bottoms and tap holes. Diagrams, table. (D2)

214-D. (Russian.) **Operation of Blast Furnaces Under a Modified System of Shaft and Bosh Cooling.** G. G. Oreshkin. *Metallurg,* no. 3, Mar. 1956, p. 1-7.

Data on performance of two experimental blast furnaces with plate cast iron coolers, one with standard dimensional specifications, the other

with profile modifications taking account of the stabilized dimensional changes in the former after a number of years of operation. Advantages and details of the modification and its bearing on cooling requirements. Diagrams, tables, graph. (D1, Fe)

215-D. (Russian.) **Use of Oxygen in the Converter.** S. G. Afanas'ev. *Metallurg,* no. 3, Mar. 1956, p. 8-13.

Method of accelerating the converter process with oxygen blast. Design of the converter, technology of refining, mechanical properties of the steel. Diagrams, graph, photograph, tables. (D3, Q general, ST)

216-D. (Russian.) **Rate of Interaction Between Solid Components of Blast Furnace Slag.** B. A. Shilt, A. P. Liuban and V. G. Manchinskii. *Stal,* v. 16, no. 4, Apr. 1956, p. 303-307.

Experimental data on the formation of solid silicates and aluminosilicates of calcium and manganese prior to formation of liquid slag in the blast furnace. Suggests a theory of diffusion nature of the interaction process between solid components of the slag. Graphs, diagram. 7 ref. (D1, B21, Fe)

217-D. (Russian.) **Study of Metallic Properties of Continuous Castings.** N. L. Komandin. *Stal,* v. 16, no. 4, Apr. 1956, p. 307-316.

Number of aspects of continuous castings, crystallization conditions, macrostructure, mechanical properties; nonmetallic impurities, surface of the casting, fissure formation, technological processing. Graphs, photographs, tables, micrographs. (D9, N12, ST)

218-D. (Russian.) **Behavior of Oxygen and Nitrogen in the Bath of the Electric Arc Furnace During Oxidation With Oxygen and With Ore.** S. M. Gnuchev, G. K. Komissarov and Z. V. Klochkova. *Stal,* v. 16, no. 4, Apr. 1956, p. 323-327.

Behavior does not depend on whether the metal is oxidized with oxygen or with ore. In the case of oxygen, however, the upper limits of concentration of oxygen and nitrogen in the metal are reached in a shorter time and with less consumption of electric power. Tables, graphs. 2 ref. (D5, ST)

219-D. (Spanish.) **Experiments on the Casting and Preparation of the Ingot Obtained by the Continuous Cold Ingot-Mold System.** Franz Leitner. *Instituto del Hierro y del Acero,* v. 9, no. 44, Mar. 1956, p. 258-266.

Continuous casting equipment at Breitenfeld steel plant. Details of installation and successful operation. Diagram, photographs, micrographs, graph, table. (D9, ST)

220-D. The Refining of Stahleisen by the Oxy-Steam Process. H. Kosmider and A. Weyel. *Blast Furnace and Steel Plant,* v. 44, May, 1956, p. 483-492, 502.

Full-scale converter experiments involving the blowing of stahleisen with oxygen and steam. Comparison of bottom-blown and surface injection converters to illustrate differences in the practical application and economics of the two methods. Improvement of the heat balance by after-burning of converter waste gases. Graphs, tables. 9 ref. (D8, ST)

221-D. Performance of Carbon Blocks in Hearth Walls and Bottom of Blast Furnace. I. G. Polovchenko. *Henry Brutcher Translation No.* 3646, 11 p. (Abridged from *Stal,* v. 15, no. 10, 1955, p. 891-894.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 31-D, 1956. (D1, B19, Fe)

222-D. Kinetics of Reduction of Iron Oxides by Gaseous Reductants at Low Temperatures. A. G. Moskicheva and G. I. Chufarov. *Henry Brutcher Translation No.* 3704, 6 p. (From *Doklady Akademii Nauk SSSR,* v. 105, no. 3, 1955, p. 510-513.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 87-D, 1956. (D general, Fe)

223-D. The Demag-Humboldt Low-Shaft Furnace Process. H. Reinfeld. *Henry Brutcher Translation No.* 3710. (Part from *Radex Rundschau,* no. 6, 1955, p. 532-543.) Henry Brutcher, Altadena, Calif.

Production of higher grade pig iron in a modified furnace. Operational and technical details. Tables, graphs, diagrams, micrographs. 13 ref. (D1, Fe)

224-D. (Czech.) **Energetic and Economic Balance of the (LD) Oxygen Process.** Alexander Dekanovsky. *Hutnické Listy,* v. 11, no. 4, Apr. 1956, p. 241-248.

Attempts to make a thermo-energetic balance of the oxygen process and to compare it with the basic bessemer process. Tables, graphs. 6 ref. (D8, D3, ST)

225-D. (French.) **Statistical Study of Consumption in the Casting and Rolling of Steel.** M. Spreux. *Centre de Documentation Sidérurgique, Circulaire d'Informations Techniques,* v. 13, no. 4, 1956, p. 735-743.

Statistical study to obtain average consumption figures for each op-

eration in the casting of steel and the rolling of an ingot. Graphs. (D9, F23, S12, ST)

226-D. (Italian.) **Induction Stirring. Application to Desulfurization.** J. Duflot and M. Porcheray. *Metallurgia Italiana,* v. 48, no. 3, Mar. 1956, p. 101-110.

Equipment, operation and results when applied during desulphurization. Tables, graphs. 3 ref. (D5, ST)

227-D. (Japanese.) **Recent Development of Electric Arc Furnaces for Steel Melting.** Tatsuo Hayashi. *Iron & Steel Institute of Japan, Journal,* v. 41, no. 5, May 1955, p. 536-550.

Developments in operation and construction of electric-arc furnaces in United States and Japan; production of electrodes and refractories; operation methods, especially oxygen smelting and induction stirring; economic problems of electric furnaces based on expenses incurred for various production units. Graphs, tables. 75 ref. (D5, ST)

228-D. The Fluxing of Iron Ore Gangue by Dolomitic Limestone. P. D. S. St. Pierre. *Canadian Mining and Metallurgical Bulletin,* v. 49, no. 529, May 1956, p. 360-367; *Canadian Institute of Mining and Metallurgy, Transactions,* v. 59, 1956, p. 224-231.

Melting relationships of blast furnace slag compositions. Tables, diagrams, graphs. 3 ref. (D1, B21, Fe)

229-D. Faster Open Hearth Charging. Improving Scrap and Supply Services. M. D. J. Brisby. *Iron and Steel,* v. 29, May 1956, p. 163-165.

Charging times, scrap quality and pan weights, effect of bad scrap and scrap preparation. Tables, graphs. 2 ref. (D2, ST)

230-D. Studies on a 10-Cwt. Arc Furnace. W. H. Glaisher, M. Preston and J. Ravenscroft. *Iron and Steel Institute, Journal,* v. 183, May 1956, p. 22-41.

The study was chiefly on electricity and electrode consumption and on roof wear, and was concerned principally with the melting phase of the process, although some of the conclusions obtained also apply to the refining stage. Tables, diagrams, graphs. 5 ref. (D5, ST)

231-D. Some Factors Affecting Electrode Consumption in the Electric Arc Furnace. D. H. Houseman. *Iron and Steel Institute, Journal,* v. 183, May 1956, p. 48-53.

The direct potential-drop method was used to study the relationship between electrode consumption and resistivity. Tables, graphs, diagram. 9 ref. (D5)

232-D. Instrumentation in Steelworks. I. The Open-Hearth Steelworks. II. The Basic Bessemer Steelworks. G. Husson and P. J. Leroy. *Iron and Steel Institute, Journal,* v. 183, May, 1956, p. 54-63.

Use of immersion pyrometers, pressure gauges, flow meters, total-radiation pyrometers, photoelectric cells and suction pyrometers in open-hearth steelworks; advantages in a basic bessemer steelworks of volumetric recording flow meters, two-color pyrometers, flame pyrometers and opacimeters. Graphs, diagrams, photographs. 13 ref. (D2, D3, S16, S18, ST)

233-D. (French.) **The Hot-Blast Cupola in an Openhearth Steel Plant.** S. Tunder. *Métallurgie,* v. 88, no. 4, Apr. 1956, p. 367-368, 371.

Use of cupola for melting scrap iron and producing liquid cast iron charged in the openhearth. Photographs. (D2, E10, CI)

234-D. (French.) **A Systematic Study of Desulfurization Processes.** Borut Marincek. *Revue de Métallurgie,* v. 53, no. 1, Jan. 1956, p. 67-75.

Desulfurization processes are improved by increasing stability of the formed sulfides and activity of sulfur in the melt, and by lowering partial pressure of oxygen. Diagram, graphs, tables. 12 ref. (D general)

235-D. (French.) **Methods for the Determination of the End of Refining in the Basic Bessemer Process, Especially From Samples Taken With a Spoon.** J. Klärding and H. Rohr. *Revue de Métallurgie,* v. 53, no. 2, Feb. 1956, p. 81-91.

Photographs of test pieces were used to determine the end-point of refining and metallurgical conditions during refining. Photographs, graphs, micrographs. 19 ref. (D3, S11, ST)

236-D. (French.) **Practical Importance of the Chemical Composition of the Slag From an Efficient Desulfurization in the Openhearth.** Bernhard Matuschka. *Revue de Métallurgie,* v. 53, no. 3, Mar. 1956, p. 205-212; disc., p. 212-214.

Maximum solubility of the slag for the sulfur and the sulfur balance are important considerations. Tables, graphs. 3 ref. (D2, B21, ST)

237-D. (French.) **Process of Prerefining of the Melt by Injection of Oxygen-Enriched Air in the Hearth of the Blast Furnace.** Kuro Kanamori. *Revue de Métallurgie,* v. 53, no. 4, Apr. 1956, p. 305-310.

Air at 40% oxygen was injected into the iron, using a three-ton blast

furnace equipped with a special nozzle. Diagrams, graphs, table. (D1, CI)

238-D. (German.) **The Bloomery Rotary Kiln of the V.E.B. Maxhütte.** Friedrich Linder and Horst Weidermann. *Neue Hütte,* v. 1, no. 5, Mar. 1956, p. 280-292.

Technology, transport of raw materials, charge materials, dust removal equipment, measuring, recording and switching appliances, material and volume flow diagram. Micrographs, photographs, diagrams. 5 ref. (D8, Fe)

239-D. (German.) **Technology of Multiple Continuous Casting.** R. Baake and H. Rosahl. *Neue Hütte,* v. 1, no. 5, Mar. 1956, p. 293-302; disc., p. 303.

Principles, comparison with discontinuous process, proposals for use in existing plants, commercial possibilities. Tables, diagrams, photographs, graphs. 6 ref. (D9)

240-D. (German.) **The Thermal Conditions in a Continuous Casting Ingot Mold.** Joachim Tischendorf. *Neue Hütte,* v. 1, no. 5, Mar. 1956, p. 303-307.

Influence of vibrations upon heat transfer. Graphs, diagrams. 3 ref. (D9)

241-D. (Book.) **Blast Furnace, Coke Oven and Raw Materials Committee of the Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, Proceedings (Annual Volume),** v. 14, 1955, 378 p. American Institute of Mining and Metallurgical Engineers, 29 West 39 St., New York N. Y.

Papers, abstracted separately, cover various aspects of agglomeration, raw materials, blast furnace theory and operation, coal and coke. (D1, B16, B18, Fe)

242-D. Blast Furnace Oxygen Operations. Julius H. Strassburger. *Blast Furnace and Steel Plant,* v. 44, June 1956, p. 626-635.

Plant equipment and operation, moisture control of oxygenated air, economics of blast enrichment. Tables, diagrams, photographs, charts. (D1)

243-D. Desulphurization of Basic Iron With Calcium Carbide. E. J. Whittenberger, A. J. Deacon and L. C. Hymes. *Blast Furnace and Steel Plant,* v. 44, June 1956, p. 644-647, 689.

Efficiency of desulphurization in 65-ton ladles of basic hot metal evaluated as a function of initial sulphur content, iron temperature and/or reladling practice, rate of injection and depth of immersion of the graphite injection tube. Tables, diagrams, photograph. (To be continued.) (D9, Fe)

244-D. Electric Smelting Furnaces. Marvin J. Udy. *Electrochemical Society, Journal,* v. 103, June 1956, p. 353-355.

The kilowatt per cubic foot of molten material and constancy of the peripheral ohms factor are important to operation. Tables. 2 ref. (D5)

245-D. Future Developments in Steelmaking. H. H. Burton. *Engineer,* v. 201, May 25, 1956, p. 555-556.

Ingot making, hot working and heat treatment discussed from standpoint of meeting future engineering needs.
(D general, F general, J general, ST)

246-D. Oxygen Steel in the United States. C. R. Austin. *Iron and Steel Engineer,* v. 33, May 1956, p. 64-68.

Layout and operation of oxygen converter steel plant. Steel quality is good, production flow is even and process is flexible. Photograph, diagram, graphs. (D8, ST)

247-D. Steels Degassed During Pouring of Large Forging Ingots. Arthur Tix. *Metal Progress,* v. 69, June 1956, p. 81-87.

When well-made steel is teemed into a mold in a vacuum chamber half of the hydrogen is sucked out and the steel is free of flakes even if sections as large as 30-in. rounds are air cooled from the forging heat. Graphs, tables, diagrams, photographs. (D8, D9, ST)

248-D. (German.) **Converter Lining in the Surface Blow Steel Converter Plant at Donawitz.** Alfred Wegschedler. *Stahl und Eisen,* v. 76, no. 10, Mar. 19, 1956, p. 595-599.

Oxygen steel converters are lined with cheapest commercial magnesite bricks in the bottom and with special magnesite bricks in the cylindrical shell. Diagrams. (D8, ST)

249-D. Desulphurization of Liquid Pig Iron by Blowing With Lime Powder. B. Trentini, L. Wahl and M. Allard. *Iron and Steel Institute Journal,* v. 183, June 1956, p. 124-133.

New process using high concentrations of lime in the gas produces extremely effective conditions of contact between desulfurizing agent and liquid pig iron, owing to use of immersed tuyeres. (D9, CI)

250-D. Study on a Model of Aerodynamics of a Maerz-Type Open-Hearth Furnace With Preheated Gas and a Comparison With Siemens and Terni Furnaces. G. Husson, G. Cohen

de Lara and R. Durand. *Iron and Steel Institute, Journal,* v. 183, June 1956, p. 134-145.

Tests established that Maerz-type furnace flame, given uniform excess of air, is much shorter than that of Siemens and Terni furnaces. (D2, D8)

251-D. The History and Practice of the Acid Bessemer Steelmaking Process in West Cumberland. F. B. Cawley and D. R. Wattleworth. *Iron and Steel Institute, Journal,* v. 183, June 1956, p.198-207.

Effect of manganese and silicon contents; slag-metal relationships in the acid converter; design of converter; use of oxygen. (D3, A2, ST)

252-D. Control in the Acid Bessemer Process. Application of Volume Debitgraphe, Opacimeter, and Flame Pyrometer. P. J. Leroy, J. G. Galey and F. B. Cawley. *Iron and Steel Institute, Journal,* v. 183, June 1956, p. 208-224.

Effect of bath depth, blowing rate and silicon content on air consumption per ton of iron. Continuous recording of flame opacity is an effective method of determining endpoint of blow. (D3, ST)

253-D. Ingot Heat Conservation. L. H. W. Savage and M. D. Ashton. *Iron and Steel Institute, Journal,* v. 29, June 1956, p. 229-235.

Cooling of 15-ton rimming-steel ingots between teeming and stripping. (D9, CI)

254-D. Control in the Acid Bessemer Process. P. J. Leroy, J. G. Galey and F. B. Cawley. *Iron and Steel Institute, Journal,* v. 29, June 1956, p. 222-228; disc., p. 275-277.

Application of "Volume Debitgraphe" air flowmeter, flame opacimeter and flame pyrometer. (D3)

255-D. Acid Bessemer Steelmaking. F. B. Cawley and D. R. Wattleworth. *Iron and Steel Institute, Journal,* v. 29, June 1956, p. 217-221; disc., p. 275-277.

History and practice in West Cumberland. Design and operation of converters. (D3, A2, ST)

256-D. Vacuum Casting of Large Forging Ingots Beginning in U. S. *Steel Processing,* v. 42, June 1956, p. 327.

Process is expected to improve quality of steel in large ingots by reducing amount of trapped gases and thus eliminating small hidden defects. (D8, D9, ST)

257-D. (German.) **Continuous Casting of Rimmed Basic Bessemer Steel.** Hans Kosmider, Herbert Neuhaus and Arthur Weyel. *Stahl und Eisen,* v. 76 no. 11, May 31, 1956, p. 668-678.

Determination of temperature losses from converter to continuous casting unit, interpretation of solidification phenomena, segregation behavior, behavior of cast billets in rolling. (D9, E25, F23, ST)

258-D. (Russian.) **Influence of Certain Factors on the Extent of the Oxidation Zone.** B. N. Zherebin, V. M. Minkin, I. D. Nikulinskii, V. M. Obsharov, I. A. Suchkov and M. Ia. Ostroukhov. *Stal',* v. 16. no. 5, May 1956, p.391-396.

Increased blast as well as increased temperature and moisture content of the blast tends to lead to an increase of the oxidation zone in the blast furnace. Extent of the zone depends on kinetic energy of the blast. (D1)

259-D. (Russian.) **Regulation of the Flow of Gases in the Blast Furnace.** N. N. Chernov and I. F. Domnitskii. *Stal',* v. 16, no. 5, May 1956, p. 402-408.

For better regulation of gas flow, measuring instruments must be supplemented by analyses of waste gas taken at regular intervals along two perpendicular diameters. Optimum working conditions are achieved when carbon dioxide content at center of cross section is 2 to 3% lower than at the periphery. (D1, S18)

260-D. (Russian.) **Temperature Check of Molten Steel With the Aid of Thermocouples.** S. G. Otlivanov and I. A. Sokolov. *Stal',* v. 16, no. 5, May 1956, p. 409-415.

Procedures and results of industrial use of thermocouples for control of temperature in steel smelting furnaces. (D general, S16, ST)

261-D. (Russian.) **An Improved Method for Preliminary Deoxidation of Steel.** N. I. Shirokov, B. G. Petukhov and A. I. Borodulin. *Stal',* v. 16, no. 5, May 1956, p. 415-422.

Preliminary deoxidation of metal in the openhearth furnace, with ferromanganese but without ferrosilicon, improves efficiency of furnace and quality of metal, and reduces costs. (D2, ST)

262-D. (Russian.) **Influence of Technology of Smelting and Casting of Rimmed Steel on the Amount of Lamination Rejects.** P. S. Plekhanov, N. S. Mikhilets, A. E. Gorelkina and N. G. Nikulin. *Stal',* v. 16, no. 5, May 1956, p. 422-430.

Influence of technological factors on development of defects in upper parts of ingot with subsequent lamination discussed on basis of several

experimental and a large number of industrial smeltings. Optimum conditions of smelting and casting. (D9, E10, ST)

263-D. (Russian.) **Smelting of Rail Steel From Low-Manganese Cast Iron Without Adding Ferromanganese During Rimming.** E. Ia. Zarvin, N. S. Mikhailets and K. V. Demykin. *Stal'*, v. 16, no. 5, May 1956, p. 431-437.

Study of reduction of low-manganese cast iron shows that during the rimming a manganese content below the previously required 0.2% has no adverse effect on the quality of the steel smelted and leads to technological advantages. Tables, graphs, diagrams. (D general, ST, CI)

264-D. (Russian.) **Injection of Air Into the Nozzle Chambers of Openhearth Furnaces.** L. S. Klimasenko, M. Ia. Medzhibozhskii, E. I. Korochkin, N. I. Bovin and D. Z. Savostin. *Stal'*. v. 16, no. 5, May 1956, p. 462-465.

Injection of compressed air into the nozzle chambers reduces smelting time by 30-40 min. due to a more complete combustion of fuel in the working area of the furnace, formation of a better torch and a certain increase of the thermal load. (D2)

265-D. Burdening a Blast Furnace for Minimum Costs. David R. Bailey. *American Institute of Mining and Metallurgical Engineers, Blast Furnace, Coke Oven and Raw Materials Conference Preprint,* 1956, Apr. 1956, 15 p.

Application of linear programming techniques to metallurgical and economic factors in burdening has afforded a very promising method of attacking this problem. (D1)

266-D. A Comparison of Blast Furnace Penetration With Model Studies. J. B. Wagstaff and W. H. Holman. *American Institute of Mining and Metallurgical Engineers, Blast Furnace, Coke Oven and Raw Materials Conference, Preprint,* 1956, Apr. 1956, 11 p.

A new correlation of air penetration which agrees with other data. Data taken by rodding the tuyeres are examined critically. (D1, Fe)

267-D. Desulphurization of Blast Furnace Iron With Injected Calcium Carbide. Daniel E. Watkins and J. R. McFarland. *American Institute of Mining and Metallurgical Engineers, Blast Furnace, Coke Oven and Raw Materials Conference,* 1956, Apr. 1956, 7 p.

A consistent and reproducible method for removing sulphur from iron in blast furnace ladles. Equipment is simple to operate, install and maintain. (D9, D1, Fe)

268-D. Desulphurization of Molten Iron. J. N. Hornak and E. J. Whittenberger. *American Institute of Mining and Metallurgical Engineers, Blast Furnace, Coke Oven and Raw Materials Conference, Preprint,* 1956, Apr. 1956, 13 p.

Injection technique was effectively used with calcium carbonate, burnt lime, calcium cyanamide and calcium carbide. (D2, Fe)

269-D. Low Fuel Rates Obtained With Three-Foot Blast Furnace Using Prepared Ores and Coke-Anthracite Mixtures. Russell C. Buehl and Miles B. Royer. *American Institute of Mining and Metallurgical Engineers, Blast Furnace, Coke Oven and Raw Materials Conference, Preprint,* 1956, Apr. 1956, 15 p.

Taconite pellets and a coarse ore-sinter mixture were smelted at fuel rates of 1450 and 1700 lb. per net ton compared with 2000 lb. per ton required for Mesabi ore. (D1, B18)

270-D. The New High-Grade Iron Ores and Agglomerates and Their Effect on Coke Rates. John Griffen. *American Institute of Mining and Metallurgical Engineers, Blast Furnace, Coke Oven and Raw Materials Conference, Preprint,* 1956, Apr. 1956, 8 p.

The new iron ores and beneficiated raw materials will reduce slag volumes, which will create difficulties in obtaining control of sulphur in the hot metal and will make the use of low-sulphur coking coals a matter of vital importance. (D1, B14, Fe)

271-D. Operating Experiences With High Beneficiated Burdens. D. Joyce, W. P. Dowhaniuk and B. Marsden. *American Institute of Mining and Metallurgical Engineers, Blast Furnace, Coke Oven and Raw Materials Conference, Preprint,* 1956, Apr. 1956, 6 p.

Improvements in sinter cooling and handling, and more attention to the chemical and physical properties of the sinter produced will lead to additional benefits. (D1, B16, Fe)

272-D. Problems Connected With Basic-Lined Hot-Metal Mixers. H. Parnham. *British Ceramic Society, Transactions,* v. 55, May 1956, p. 339-358; disc., p. 358-368.

Factors influencing lining life, mixer design and slagging. (D general, B19)

273-D. Temperature and Heat Flow in the Hearths of Blast Furnaces With

and Without Underhearth Cooling. V. Paschkis and Taghi Mirsepassi. *Iron and Steel Engineer,* v. 33, June 1956, p. 116-128; disc., 128-132.

The all-carbon hearth should have less salamander penetration than combinations of ceramic and carbon with equal cooling. Underhearth cooling is feasible from a thermal standpoint and will reduce size of salamanders, but will not affect frequency of sidewall breakouts. (D1)

274-D. One Hundred Years of Bessemer Steelmaking. A. B. Wilder. *Journal of Metals,* v. 8, June 1956, p. 742-753.

Historical development of steelmaking processes. (D3, ST)

275-D. On the Basic Pneumatic Processes of Steelmaking. P. Coheur and H. Kosmider. *Journal of Metals,* v. 8, June 1956, p. 754-759.

New methods of blowing permit a better gearing of steel plant to market and raw material conditions. (D3, D8, ST)

276-D. The L-D Process in Austria. B. Matuschka. *Journal of Metals,* v. 8, June 1956, p. 760-761.

Data on the production of steel with the use of an oxygen lance in a converter-like vessel. Results are identical to openhearth grades. (D8, ST)

277-D. Future Trends of the Pneumatic Process. J. E. Stukel. *Journal of Metals,* v. 8, June 1956, p. 763.

Two recent European developments may prove quite effective in producing quality steel at a low cost. (D8, D3, ST)

278-D. New Control Instruments for Bessemer Steelmaking. P. Leroy. *Journal of Metals,* v. 8, June 1956, p. 764-768.

Volume-debitgraphe flowmeter, two-color pyrometer, flame pyrometer, opacimeter. (D3, ST)

279-D. (Czech.) **Diffusion Deoxidation in the Basic Openhearth Furnace.** Zdenko Zdenek. *Hutnik,* v. 6, no. 2, Feb. 1956, p. 37-41.

Evaluation of various methods of diffusion deoxidation and the effect on consumption of alloying and deoxidizing additions as well as on the quality of steel. (D2, ST)

280-D. (French.) **Some Factors Affecting Electrode Consumption in the Electric Arc Furnace.** D. H. Houseman. *Revue de Métallurgie,* v. 53, no. 5, May 1956, p. 343-350.

Direct potential drop method of electrode measurement used to sort electrodes into groups, on a resistivity basis, to show the direct and statistically valid relationship between resistivity and consumption. Long term trials, using only electrodes of low and medium resistivity, have shown that large savings are possible in electrode costs. (D5)

281-D. (French.) **Studies on a 10-Cwt. Arc Furnace (About 500 Kg.)** W. H. Glaisher, M. Preston and J. Ravenscroft. *Revue de Métallurgie,* v. 53, no. 5, May 1956, p. 351-378.

To determine the most economical operating conditions, the investigation was primarily concerned with the electricity and electrode consumption, roof wear and the melting phase of the process. (D5)

282-D. (French.) **Desulphurization of Iron by Powdered Lime.** B. Trentini, L. Wahl and M. Allard. *Revue de Métallurgie,* v. 53, no. 5, May 1956, p. 388-399.

Technique based on the injection of lime in a stream of inert gas, with a very low sulphur content resulting, within a treatment time of only 3 to 4 min. (D9)

283-D. (German.) **A Contribution to the Heat Diagram of the Blast Furnace.** Paul Reichardt. *Stahl und Eisen,* v. 76, no. 12, June 14, 1956, p. 731-738.

Calculation and graphic representation of the heat capacity and the heat requirements of the charge, of the heat available in the gas stream, and of the temperature gradient in the single temperature ranges. (D1, ST)

284-D. (German.) **The Conditions of Precipitating Oxide Contaminations of the Steel in the Pouring Ladle.** Erwin Plöckinger. *Stahl und Eisen,* v. 76, no. 12, June 14, 1956, p. 739-748.

Importance of the single operating phases of steelmaking for the degree of purity obtained in the steel. Aspect and composition of inclusions observed in steel. (D9, ST)

285-D. (German.) **The Killing of Deep-Drawing Steel in the Mold (Chemically Capped Steel Ingots).** Wilhelm Gerling and Karl-Otto Zimmer. *Stahl und Eisen,* v. 76, no. 13, June 28, 1956, p. 799-805.

Defects encountered in killed, semikilled and effervescent soft steels. Chemically "capped" steel, its technological properties and economic importance. (D9, ST)

286-D. (Japanese.) **Blowholes in Iron and Steel. V. Some Examples of Blowhole Formation by Hydrogen.** Take-

hiko Fujii. *Iron & Steel Institute of Japan, Journal,* v. 42, no. 6, June 1956, p. 467-475.

An analysis of the cause of blowholes in steel, when cast in steel and sand molds, and in large killed ingots. (D9, E11, N1, Fe, ST)

287-D. Some Aspects of Blast Furnace Operation. E. H. Baldwin. *Blast Furnace and Steel Plant,* v. 44, July 1956, p. 740-746.

Coke quality, sinter quality, scrap charging, furnace temperature and sulfur control. (D1)

288-D. Desulphurization of Basic Iron With Calcium Carbide. E. J. Whittenberger, A. J. Deacon and L. C. Hymes. *Blast Furnace and Steel Plant,* v. 44, July 1956, p. 747-754.

Desulphurization by ladle injection of calcium carbide entrained in a nitrogen gas stream is a reproducible and dependable process. Higher initial sulfur contents and iron temperatures significantly increase efficiency. (D9, Fe)

289-D. H-Iron: Competition for the Blast Furnace? P. M. Unterweiser. *Iron Age,* v. 178, July 12, 1956, p. 71-74.

The H-Iron process directly reduces iron ore fines with hydrogen, efficiently and cheaply. The end product, metallic iron, suits both openhearth and electric furnaces. (D8, Fe)

290-D. Bright Future Seen for Vacuum Investment Castings. F. Kenneth Iverson. *Iron Age,* v. 178, July 19, 1956, p. 120-122.

Growing number of high-temperature applications demands unique alloys with top heat resisting properties. Tests show that vacuum investment castings may be better than wrought products in some areas, but furnace cost is a problem. (D8, E15)

291-D. (French.) **Recent Developments in the Continuous Casting of Steel.** *Métallurgie,* v. 88, no. 5, May 1956, p. 459-467.

New developments in the metallurgical, technical and economic aspects of continuous steel casting. (D9, ST)

292-D. (Polish.) **The Effect of Drying and Starting Blast Furnaces on the Life of the Lining.** Aleksander Maslanka and Rowman Stec. *Wiadomosci Hutnicze,* v. 12, no. 6, 1956, p. 166-173.

Prolonging the life of furnace linings by proper drying and start-up procedures. Continuous observation of the operating temperature of lining by means of thermocouples. (D1, S16)

293-D. (Russian.) **Intensification of Steel Melting With the Aid of Oxygen.** G. A. Podoloskaia and V. A. Makovskii. *Metallurg,* no. 6, June 1956, p. 17-19.

A recently developed method of intensifying melting with the aid of oxygen introduced both into the fuel and into the bath. (D2, ST)

294-D. (Russian.) **Experimental Melting of Chromium-Nickel Steel From a Charge With Lower Than 1.50% Cr Content.** P. K. Morokov and B. G. Petukhov. *Metallurg,* no. 6, June 1956, p. 20-23.

Experimental melting of Cr-Ni steels from charges with a low chromium content shows that such melting does not complicate the technological process, does not lower the grade of the metal and appears to be economically feasible. (D2, AY)

295-D. (Spanish.) **Modern European Technology in the Construction of Open-Hearth Furnaces.** Franz Bartu and Hueimo Leopold. *Instituto del Hierro y del Acero,* v. 9, no. 45, Apr. 1956, p. 386-403; disc., p. 403-404.

Construction of different parts of the furnace; use of modern suspension systems; installation of modern auxiliary equipment; measuring and control apparatus. (D2)

296-D. (Spanish.) **The Demag-Humboldt Process in the Low-Shaft Blast Furnace.** Hans Reinfeld. *Instituto del Hierro y del Acero,* v. 9, no. 46, May 1956, p. 485-511.

Beneficiation process by low-temperature distillation, based principally on beneficiation by a single-phase distillation. (D1, B14, ST)

297-D. (Spanish.) **Ladle Prerefining With Oxygen of Castings Very Rich in Silicon.** Pierre Leroy and Dimas Menendez Magdalena. *Instituto del Hierro y del Acero,* v. 9, no. 46, May 1956, p. 548-560.

Ladle prerefining with pure oxygen done in France with cast irons containing 0.50 to 1% silicon can also be applied to certain Spanish cast irons containing 2 to 3% silicon. (D9, Fe, CI)

298-D. Steelmaking Developments During the Past Decade. Karl L. Fetters. *Industrial Heating,* v. 23, July 1956, p. 1429 + 5 pages.

Better production with existing facilities has accounted for 20% of the production gain. Some of the practices responsible for this increase are reviewed. (D general, ST)

299-D. Automatic Control of Continuous Casting of Steel in Russia.

L. K. Tatochenko. *Instrument Practice,* v. 10, June 1956, p. 518-519. (From *Stal,* Mar. 1956, p. 212.)

Gamma radiation devices are used for controlling the level of liquid metal in the mold. (D9, S19, ST)

300-D. Lesson in Electrodes. *Steel,* v. 139, July 23, 1956, p. 86, 88.

How to get the most out of electric furnace electrodes. The payoff is better melt shop performance. (D5)

301-D. Hot Tops Increase Ingot Yield. *Steel,* v. 139, July 30, 1956, p. 100.

An exothermic hot top composition improves yield 3 to 10%, means less segregation in the ingot, and less splintering. (D9, ST)

302-D. (French.) **A Study on a Reduced Pattern of the Aerodynamics of a Gas-Preheated Maerz Openhearth, and Comparison with a Siemens and a Terni Hearth.** G. Husson, G. Cohen de Lara and R. Durand. *Revue de Métallurgie,* v. 53, no. 6, June 1956, p. 411-425.

Results obtained with a Maerz hearth. (D2, ST)

303-D. Continuous Casting of Steel. Isaac Harter, Jr. *Iron and Steel Engineer,* v. 32, Apr. 1956, p. 58-61; disc. p. 61-62.

Increased yield, reduced segregation, high surface quality and low capital investment are important features. (D9, ST)

304-D. Modern European Hot Blast Changing Equipment. Herman Jansen. *Iron and Steel Engineer,* v. 33, July 1956, p. 137-143.

Features complete mechanization of reversal, centralization of supervision, high efficency burners and short reversal times. (D1)

305-D. Blast Furnace Oxygen Operations. Julius H. Strassburger. *Iron and Steel Engineer,* v. 33, July 1956, p. 154-158.

Oxygen plant operation and the use of oxygen for the enrichment of the blast for blast furnace operation. (D1, ST)

306-D. Use of Oxygen to Increase the Rate of Refining in Steelmaking. H. Kosmider. *Henry Brutcher, Translation No.* 3709, 15 p. Henry Brutcher, Altadena, Calif. (Abridged from *Stahl und Eisen,* v. 75, no. 22, 1955, p. 1433-1439.)

Advantage of processing preblown pig iron in openhearth furnace. Converter blowing time and converting rate as depending on volume of oxygen supplied per unit time and on oxygen enrichment of blast. (D2, ST)

307-D. (German.) **Comparative Observation of the Oxygen Converter Process with the Classic Steel Production Method.** A. Legat. *Schweizer Archiv für Angewandte Wissenschaft und Technik,* v. 22, no. 6, June 1956, p. 200-203.

Comparison of physico-chemical characteristics. The low phosphorus and sulfur contents of oxygen-converter steel constitute a particular quality factor. (D2, D8, ST)

308-D. Reduction of Oxides of Iron by Gases. B. V. Kondakov and Z. F. Chukhanov. *Henry Brutcher, Translation No.* 3768, 6 p. (From *Doklady Akademii Nauk SSSR,* v. 106, no. 4, 1956, p. 697-700.) Henry Brutcher, Altadena, Calif.

Rate constants for the reduction of ferrous oxide, from extremely simple experiments. (D8, Fe)

309-D. Burning-In of a New Bottom in a Large All-Basic Open-Hearth Furnace. V. O. Kulikov and I. I. Bornatskii. *Henry Brutcher, Translation No.* 3531, 11 p. (From *Stal',* v. 15, no. 7, 1955, p. 597-600.) Henry Brutcher, Altadena, Calif.

Practice, developed at a Russian steel plant, for new bottoms in 410-net ton all-basic openhearth furnaces. Materials used for the burning-in of bottom and banks; duration of sintering. (D2, B19, ST)

310-D. Influence of Conditions of Crystallization Upon Tearing of Steel Ingots. V. A. Efimov, V. I. Danilin and M. P. Lapshova. *Henry Brutcher, Translation No.* 3644, 15 p. (From *Stal',* v. 15, no. 7, 1955, p. 601-606.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 330-D, 1955. (D9, ST)

311-D. (German.) **Converter Bottom With Jets in Thomas Steel Works at Hayingen.** Raymond Remy. *Stahl und Eisen,* v. 76, no. 14, July 12, 1956, p. 879-881.

Magnesite bottom increases productivity. Effect of round-the-clock operation. (D3, B19, ST)

312-D. (Russian.) **Effect of Heating the Blast on the Operation of a Blast Furnace.** I. G. Voichenko. *Stal',* v. 16, no. 6, June 1956, p. 483-486.

Also studied were the effects of the size and shape of the oxidizing zone, the blast temperature, ore-charge size and other parameters. (D1, CI)

313-D. (Russian.) **Effect of Elevated Pressure of Gas on the Chemical Composition of Pig Iron.** V. L. Pokryshkin. *Stal',* v. 16, no. 6, June 1956, p. 487-492.

Adapting blast furnaces to use of elevated pressures decreases the degree of reduction of silicon and manganese and improves carbonization of the metal. Decrease in coke expenditure and a more even furnace operation account for a decrease in sulfur content. (D1, CI)

314-D. (Russian.) **Use of Oxygen in the Openhearth Scrap-Ore Process.** I. P. Bardin, K. G. Trubin, L. M. Efimov, K. M. Trubetskov, V. N. Kornfel'd, R. I. Men'shikov and V. F. Mazov. *Stal',* v. 16, no. 6, June 1956, p. 493-505.

Relation between concentration of oxygen in the blast and melting time. Variations in methods and their effects on furnace operation and quality of the steel. (D2, ST)

315-D. (Russian.) **The Development and Practice of the Process of Continuous Casting of Steel.** M. S. Boichenko, V. S. Rutes and N. A. Nikolaev. *Stal',* v. 16, no. 6, June 1956, p. 505-513.

Carefully elaborated techniques of continuous casting are being successfully adapted in various steelmaking plants with increased economy of operation and higher quality of steel semiproducts, particularly sheet steel, made from the cast slabs. (D9, ST)

316-D. (Russian.) **Vacuum Melting of Transformer Steel.** G. A. Garnyk and A. M. Samarin. *Stal',* v. 16, no. 6, June 1956, p. 514-518.

Laboratory and semiproduction-scale tests show great improvement of magnetic properties of transformer steel when melted in a vacuum furnace and when content of nonmetallic inclusions and gases is kept low. Silicon content may be increased without creating troubles in cold rolling. (D8, P16, SG-p)

317-D. (Russian.) **Nonmetallic Inclusions in Ball-Bearing Steel.** S. I. Sapiro, *Stal',* v. 16, no. 6, June 1956, p. 519-523.

Emulsifying action of carbon in slags. Oxidation of carbon in the slag before steel is tapped from electric-arc furnace, in order to minimize formation of nonmetallic inclusions. (D5, M27, N14, ST)

318-D. The Oxygen Steelmaking Process. I. D. O. Davis. *Industrial Heating,* v. 23, Aug. 1956, p. 1641 + 8 p.

Oxygen steelmaking at a Canadian plant, economics of such a system. (To be continued.) (D8, ST)

319-D. (Czech.) **The Burning of Coke in the Tuyere Region of Blast Furnaces.** Jindrich Sarek. *Hutnik,* v. 6, no. 6, June 1956, p. 167-168.

A study of the processes taking place in the combustion areas near the tuyeres when the coke burns. The mechanism of coke movement and the gas formation in this area. D1, B18, Fe)

320-D. (Czech.) **The Use of Oxygen in Martin Furnaces.** Edward Bernard. *Hutnik,* v. 6, no. 6, June 1956, p. 168-171.

Theoretical reasons for adding oxygen, calculations for the optimum amount to be used, shortening the melting time, practical methods for introducing oxygen. (D2)

321-D. (French.) **Sulfur Pickup in Openhearth Fired With Fuel Oils.** B. Trentini, A. Peters and G. Husson. *Revue de Métallurgie,* v. 53, no. 7, July 1956, p. 529-553.

The relationship between sulfur content of fuel oil and steel shows that an increase of 1% in sulfur in the fuel leads to an increase of 0.007% in the steel. (D2, ST)

322-D. (French.) **Refractories in Blast Furnaces.** Louise Halm. *SIM—Documentation Métallurgique,* no. 26, Apr., May, and June 1956, p. 189-200.

Working conditions of blast furnaces in relation to their various parts. Qualities required in refractories. (D1, B19)

323-D. (German.) **Fine Dephosphorization in the Thomas Converter.** Heinrich Rellermeyer and Theo Kootz. *Stahl und Eisen,* v. 76, no. 15, July 26, 1956, p. 965-968.

Activity of ferrous oxide and potassium oxide in the system FeO-CaO-P_2O_5. Effect of slag basicity on oxygen and phosphorous content in steel, temperature effects. (D2, ST)

324-D. (German.) **Investigation of the Characteristics of a Mixer for Basic Bessemer Pig-Iron.** Erwin Eickworth, Hermann-Josef Kopineck and Gustav Opfer. *Stahl und Eisen,* v. 76, no. 16, Aug. 9, 1956, p. 1028-1032.

Discusses mixing efficiency, describes a large-scale test with radioactive phosphorous-32. (D3, CI, ST)

325-D. (German.) **Spectrographic Examination of the Converter Flame During the Course of the Basic Bessemer Process.** Frank Wever, Walter Koch, Horst Hofermann, Helmut Knüppel, Karl Ernst Mayer and Gert Wiethoff. *Stahl und Eisen,* v.. 76, no. 16, Aug. 9, 1956, p. 1032-1040.

Apparatus, observation stations, mode of proceeding and results of the spectro-chemical examinations. The spectrum of the decarburization and dephosphorization period.

326-D. (Russian.) **Blowing Oxygen Into the Bath in Martin Furnaces When Refining Phosphorous Cast Iron.** Ia. A. Shneerov, G. N. Oike, V. V. Leporskii, V. G. Sladkoshteev, A. I. Sukachev and P. N. Slepkanev. *Stal',* v. 16, no. 7, June 1956, p. 587-596.

Means of blowing oxygen through the bath of a 350-ton Martin furnace. Oxygen is introduced through rear wall after filling with cast iron. Quality of the metal is same as that obtained by the usual method. (D2, ST)

327-D. (Russian.) **Operating Martin Furnaces With Auxiliary Air Feed Through the Gas Opening.** S. N. Bystrov, A. A. Dobrokhotov and A. M. Morozov. *Stal',* v. 16, no. 7, June 1956, p. 597-601.

Introducing an auxiliary supply of air through the gas opening increased output by 5 to 7% and reduced the amount of fuel used. (D2, ST)

328-D. (Russian.) **Preventing Axial Cracks in Alloy Steel Ingots.** Ia. M. Bokshitskii, M. A. Pertsev and F. V. Kozlov. *Stal',* v. 16, no. 7, June 1956, p. 602-608.

Causes of axial cracks in chormium-nickel-tungsten steel ingots. Preventing these defects by slowing down the rate of cooling in the mold or by casting semimolten metal in heated molds. (D9, AY)

329-D. Steel Production Today. R. L. Knight. *Australasian Engineer,* v. 48, July 1956, p. 48-55.

Compares Bessemer, openhearth and electric arc steelmaking methods with new L. D. converter process. (D general, ST)

330-D. (Russian.) **Using Natural Gas in the Openhearth Furnace.** V. I. Palant and B. N. Kurochkin, *Metallurg,* no. 7, July 1956, p. 14-17.

Changes required for using natural gas to produce low-sulphur steel. Gas produces more heat and is cheaper than fuel oil. Operating conditions compared to heating with fuel oil. (D2, CN)

331-D. (Russian.) **Using Compressed Air to Intensify the Flame in the Openhearth Furnace.** M. G. Kozhanov and G. B. Rogov. *Metallurg,* no. 7, July 1956, p. 18-19.

Using compressed air (at 3.5 to 4.5 atmospheres) to improve combustion increased the heat 30 to 40° C. Compressed air is injected through the burners. (D2, ST)

332-D. Electric Versus Openhearth. J. E. Wilbanks. *Metal Progress,* v. 70, Sept. 1956, p. 118-119.

Shows that the electric furnace can make steel faster and cheaper whenever scrap costs less than pig iron, and the product has equal or better quality. (D2, D5, ST)

333-D. Aluminum Rod Upgrades Killed Steel. Ed Long and Bruce E. Brennan. *Steel,* v. 139, Sept. 24, 1956, p. 124, 126.

Deoxidizing in the mold with 99% pure aluminum rod uses less aluminum and improves quality of the steel. (D9, Al, ST)

334-D. Steelmaking: Portrait of Tomorrow. *Steel,* v. 139, Sept. 17, 1956, p. 137-142.

Predictions for the future in all phases of steelmaking. (D general, ST)

335-D. New Profile of Working Chamber of Open-Hearth Furnaces. F. Bartu and E. Boelens. *Henry Brutcher Translation No.* 3700, 24 p. (From *Stahl und Eisen,* v. 76, no. 3, 1956, p. 152-158.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 163-D, 1956. (D2)

336-D. Use of Oxygen for Increasing the Open-Hearth Production. A. V. Leskov. *Henry Brutcher Translation No.* 3756, 6 p. (From *Metallurg,* v. 1, no. 1, 1956, p. 7-9.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 206-D, 1956. (D2, ST)

337-D. Conference on the Continuous Casting of Steel. V. S. Rutes and A. P. Pronov. *Henry Brutcher Translation No.* 3757, 12 p. (From *Stal,* v. 16, no. 3, 1956, p. 263-265.) Henry Brutcher, Altadena, Calif.

Abstracts of 15 papers read and discussed at the conference dealing with depth of liquid phase in billet as related to withdrawal speed and other problems. (D9, ST)

338-D. Influence of Oxygen Addition to Blast Upon Particle Size of Brown Smoke From Basic Converter and of Waste Gas From Arc Furnace. R. Meldau and D. Laufhütte. *Henry Brutcher Translation No.* 3770, 14 p. (From *Archiv Eisenhüttenwesen,* v. 27, no. 3, 1956, p. 149-152.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 178-D, 1956. (D3, D5, ST)

339-D. Nonmetallic Inclusions in Rimming Steel. K. K. Neiland. *Henry Brutcher Translation No.* 3766, 17 p. (From *Latvijas PSR Zinatnu Akade-*

mijas Vestis, no. 11 (88), 1954, p. 133-146.) Henry Brutcher, Altadena, Calif.

Effect of openhearth melting variables on inclusions and strength. (D2, Q23, M27, ST)

340-D. Direct ('Ingotless') Rolling of Liquid Nonferrous and Ferrous Metals. C. Fritzsche. *Henry Brutcher Translation No.* 3778, 4 p. (From *Technik,* v. 9, no. 8, 1954, p. 453-458.) Henry Brutcher, Altadena, Calif.

Describes set-ups for the continuous casting and simultaneous rolling of molten metals. (D9, C5, F23)

341-D. Continuous Casting of Steel. M. S. Boichenko and V. S. Rutes. *Henry Brutcher Translation No.* 3790, 15 p. (From *Liteinoe Proizvodstvo,* no. 3, 1956, p. 1-4.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 193-D, 1956. (D9, C5, N12, Q general, ST)

342-D. (Polish.) **Using Thermocouples to Measure the Temperature of Steel in the Ladle.** Waclaw Dakowicz. *Wiadomosci Hutnicze,* v. 12, July-Aug. 1956, p. 215-217.

Improved means of testing temperature of steel. Special thermocouples are built into the walls of the ladle about 150 to 200 mm. above the bottom, near the stopper. (D9, S16, ST)

343-D. (Russian.) **Experience in Vacuum Metal Treatment.** V. G. Speranskii. *Metallurg,* no. 8, Aug. 1956, p. 12-15.

Improvement of transformer steel by treatment under vacuum. Teeming of high-alloyed aluminum and titanium steel under neutral atmosphere improves the structure of the ingot. (D8, AY)

344-D. (Russian.) **Treating Liquid Metal in a Vacuum.** A. M. Samarin, L. M. Novik, N. I. Goncharenko and A. F. Tregubengo. *Stal',* v. 16, no. 8, Aug. 1956, p. 700-707.

Especially good results were obtained with bessemer rimmed steel and transformer steel as shown by the quality of the metal. Construction, chemical processes involved and mechanical properties of the steels. Use with chromium-nickel structural steel. (D8, Q general, T26, ST)

345-D. (Russian.) **The Construction of Thin-Walled Blast Furnaces.** S. Chenokh. *Stal',* v. 16, no. 8, Aug. 1956, p. 682-689.

Use of blast furnaces with walls 150 to 250 mm. thick resulted in a decrease in repair costs, reduced amount of coke used, and some increase in output. (D1)

346-D. (Russian.) **Producing Rimmed Steels by Addition of Ferromanganese in the Ladle.** I. S. Marakhovskii and V. F. Mazov. *Stal',* v. 16, no. 8, Aug. 1956, p. 697-699.

A new means of deoxidizing steel by adding the ferromanganese only in the ladle. Substantially superior results over adding it in the furnace: somewhat shorter melt and considerable saving of ferromanganese with no reduction in quality of the metal. (D9, ST)

347-D. (Spanish.) **Using the "Renn-Krupp" Nodules to Make Steel in the Electric Arc Furnace.** Jorge A. Riviere. *Instituto del Hierro y del Acero,* v. 9, no. 48, July 1956, p. 739-747.

Granulometric and chemical analysis prove that iron-ore nodules can be used in the arc furnace. (D5, ST)

348-D. (Spanish.) **Principal Factors Influencing Ingot Mold Life.** Apolinar Herrero Prieto. *Instituto del Hierro y del Acero,* v. 9, no. 48, July 1956, p. 823-830.

Factors depend on design, construction and use. Results obtained in the Reinosa Factory in Spain. (D9, ST)

349-D. (Spanish.) **Continuous Steel Casting in France.** Andre Michel. *Instituto del Hierro y del Acero,* v. 9, no. 48, July 1956, p. 831-840.

Description of the first continuous casting experience at Jacob Holtzer's, with chromium-molybdenum-vanadium steels, nonoxidizing chromium steels, and many others. (D9, AY, SS)

350-D. Turner's Iron-Fibred Steel. Eric N. Simons. *British Steelmaker,* v. 22, Sept. 1956, p. 260-263.

Review of process of compounding wrought iron or wrought steel with cast steel by placing bars in the mold and pouring molten metal in the spaces between the bars. (D9, ST)

351-D. Steelmaking Since Bessemer. Charles Goodeve. *Engineer,* v. 202, Sept. 7, 1956, p. 329-332.

Starting from the inventions of Bessemer, reviews the progress made with pneumatic steelmaking processes, and modern developments in the use of "tonnage" oxygen and in top blowing. Describes briefly the "Cyclosteel" process, in which the Bessemer idea of dispersing air bubbles in a liquid metal is reviewed. (D general, A2)

352-D. Bypassing the Blast Furnace. Edmund L. Van Deusen. *Fortune,* v. 54, Oct. 1956, p. 164-167, 174, 176.

The fluid bed technique, new ores and low-cost gases have increased the possibility of a workable direct-reduction method for iron ore. (D8, Fe)

353-D. The Oxygen Steel Making Process: II. D. O. Davis. *Industrial Heating,* v. 23, Sept. 1956, p. 1824 + 4 pages.

Dust collection system, production of oxygen, advantages of process. (D8, ST)

354-D. Heat Transfer in the Open Hearth Furnace. I. M. W. Thring. *Industrial Heating,* v. 23, Sept. 1956, p. 1841 + 6 pages.

A model for calculating optimum flame, effect of emissivity and flame length. (To be continued.) (D2)

355-D. Blast Furnace Oxygen Operations. Julius H. Strassburger. *Industrial Heating,* v. 23, Sept. 1956, p. 1861 + 6 pages.

Production of oxygen in tonnage quantities and use of oxygen for enrichment of blast. (D1, ST)

356-D. Refractories and Melting Practice for Electric Steel Melting Furnaces. I. *Industrial Heating,* v. 23, Sept. 1956, p. 1924, 1926, 1928.

Factors involved in the use of shaped and monolithic refractories. (To be continued.) (D5, B19, ST)

357-D. The Measurement of Gas Transit Times in a Blast-Furnace. T. W. Johnson. *Iron and Steel Institute Journal,* v. 184, Sept. 1956, p. 18-22.

A method of determining quickly the transit time of the blast from a tuyere to various points along the stock line by using radon. (D1, S19, ST)

358-D. Automatic Control of Continuous Casting of Steel. L. K. Tatochenko. *Henry Brutcher Translation No.* 3791, 6 p. (From *Stal',* v. 16, no. 3, 1956, p. 212-214.) Henry Brutcher, Altadena, Calif.

Previously abstracted from *Instrument Practice.* See item 299-D, 1955. (D9, S19, ST)

359-D. (English.) **Rate of Desulphurization of Molten Iron by Slag Under Reducing Conditions. II. Influence of Silicon and Manganese.** Yasuji Kawai. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 8, no. 4, Aug. 1956, p. 352-360.

The rate of desulphurization of molten iron by slag increases with increasing silicon and manganese between 1490 and 1560° C. (D general, P12, Fe, Si, Mn)

360-D. (French.) **Basic Steel Obtained by Blowing With Oxygen-Carbonic Acid Mixture (Processing, Laboratory Tests, Industrial Results).** P. Boutonnet, A. Richard, P. Mathieu and R. Maret. *Revue de Métallurgie,* v. 53, no. 8, Aug. 1956, p. 575-618.

A study of about 50 castings from metal blown with an oxygen-carbon-dioxide mixture in a 20-ton basic converter, and their industrial evaluation. (To be continued.) (D3, ST)

361-D. (German.) **Continuous Casting of Iron.** Adalbert Wittmoser. *Giesserei,* v. 43, no. 18, Aug. 30, 1956, p. 473-485.

Reviews earlier work on continuous casting and the development of gravity casting at the Gelsenkirchen Ironworks. (D9, CI)

362-D. (German.) **Experiences in the Operation of a 50-Ton Openhearth Furnace Fired by Natural Gas and Oil.** Bernhard Matuschka and Giovanni Morini. *Stahl und Eisen,* v. 76, no. 18, Sept. 6, 1956, p. 1167-1173.

Charging problems, firing, changeover from producer gas to natural gas burners. Thermotechnical fundamentals and metallurgical conditions. Automatic control equipment. (D2, ST)

363-D. (German.) **The Oxygen Contents of Molten Openhearth Steels During Their Melting in Furnaces of Different Sizes.** Karl Georg Speith and Hans vom Ende. *Stahl und Eisen,* v. 76, no. 18, Sept. 6, 1956, p. 1161-1167.

Dependency of oxygen, carbon, manganese and iron contents of slag on temperature of melts originating from furnaces of 30, 60, 80 and 150 tons capacity. Effect of carbon content on oxygen content. Relations between temperature, refining speed, iron content of slag and oxygen dissolved in the steel. (D2, ST)

364-D. (Russian.) **Experimental Use of Removable Tuyeres for Feeding Oxygen Into the Forehearth.** V. A. Fuklev. *Liteinoe Proizvodstvo,* 1956, no. 8, Aug. 1956, p. 4-5.

Improvements in movable tuyeres making them easier to move, use and repair. (D2)

365-D. The Principles of Continuous Casting of Metals. D. M. Lewis and J. Savage. *Metallurgical Reviews,* v. 1, pt. 1, 1956, p. 65-116 + 2 plates.

Control of pouring, heat transfer and solidification, cooling of mold, significance of air gap, rupture of ingot skin, temperature distribution in ingots, metallurgical effects. (D9, C5)

366-D. Electronic Records Lead Way to Better Continuous Casting.

Steel, v. 139, Oct. 22, 1956, p. 86, 89.

Electronic instruments used to automatic production from molten metal to finished casting. (D9, S18)

367-D. (French.) **Tests at the Ougrée Low Shaft Blast Furnace.** F. Paschal. *Centre de Documentation Siderurgique, Circulaire d'Informations Techniques,* v. 13, no. 9, 1956, p. 1771-1775.

Study of the working conditions of an oval, low-shaft blast furnace with a double circular charging hole. Use of fuel in the form of carbonized anthracite briquettes. (D1)

368-D. (French.) **Study of the Zone of Turbulence in Front of the Tuyeres of the Ougrée Low Shaft Blast Furnace.** F. Paschal and R. Biver. *Centre de Documentation Siderurgique, Circulaire d'Informations Techniques,* v. 13, no. 9, 1956, p. 1777-1791.

Study of conditions in a low-shaft blast furnace in relation to blast turbulence, charge grain size and tuyere size varying from 50 to 80 mm. in diam. (D1)

369-D. (French.) **Comparison Between Basic Brick Roofs and Half-Siliceous Half-Basic Brick Roofs.** M. Mulsant. *Centre de Documentation Siderurgique, Circulaire d'Informations Techniques,* v. 13, no. 9, 1956, p. 1825-1829.

Economy and durability of brick, consumption, and furnace productivity with these two types of open-hearth roofs. (D2, B19)

370-D. (French.) **The Design of Ingot Molds. Square Ingot Molds for Electric Steel Plant and Flat Ingot Molds for Openhearth Plant.** J. Duflot. *Institut de Recherches de la Sidérurgie, Publications,* ser. B, no. 31, Sept. 1956, p. 569-603.

French procedures in the design of ingot molds compared with foreign practice. (D9, ST)

371-D. (French.) **Testing an Acid Poor Ore in Blast Furnace 7 at Neuves-Maisons. Comparison With Classic Process Used With Crushed Marion Ore.** M. Pasquet. *Institut de Recherches de la Sidérurgie, Publications,* ser. A, no. 140, Sept. 1956, 33 p.

Both ores were compared with respect to their iron and acid content, their reducibility and regularity, economic factors involved and the silica, sulphur manganese and phosphorus content of the cast iron obtained. (D1, CI)

372-D. (German.) **Smelting of Pure Iron by Carbon-Reduction Method and Impact Test Temperature Curves of This Iron.** Wilhelm Anton Fischer, Helmut Treppschuh and Karl Heinz Köthemann. *Archiv für das Eisenhüttenwesen,* v. 27, no. 9, Sept. 1956, p. 567-572.

Theoretical fundamentals of preparation of pure iron, reaction between smelting and ladle, work under high vacuum, new desulphurization process, determination of properties. (D general, Q6, Fe)

373-D. (German.) **Hot Cooling of Blast Furnace Tuyeres.** Karl Schilcher. *Stahl und Eisen,* v. 76, no. 19, Sept. 20, 1956, p. 1229-1231.

Basis for the experiments, technical details, temperature conditions encountered in a tuyere. (D1)

374-D. Contribution to Arc Furnace Operations. L. A. Wynd. *Iron and Steel Engineer,* v. 33, Oct. 1956, p. 135-142.

Among the improvements resulting in 70% production increases are top charging, optimum current control and increased secondary voltage. (D5, ST)

375-D. Electric Open Hearth Combustion Controls at Algoma. A. K. Bayles and D. M. Stanton. *Iron and Steel Engineer,* v. 33, Oct. 1956, p. 143-147.

Controls for furnace pressure, reversal, roof temperature, fuel-air, oil-steam and oil-gas ratios, B.t.u. input and flow of oil, steam, gas and combustion air. (D2)

376-D. A New Approach in Electric Pig Iron Smelting. F. C. Collin and O. A. Grytting. *Journal of Metals,* v. 8, sec. 1; Oct. 1956, p. 1464-1468.

Experimental technique, tests with only preheating, preheated and prereduced charge, scaling up, application of new practice. (D1, CI)

377-D. Pig Iron Production in Blast Furnaces Using Charcoal. Louis Ensch. Paper from "A Study of the Iron and Steel Industry in Latin America". v. II. United Nations, p. 154-158, 165-166.

Description of blast furnaces and comparison with electric furnaces. Forest resources, charcoal production, use of coke. (D1, CI)

378-D. Progress in the Manufacture of Pig Iron and Ferro-Alloys With the Low-Shaft Electric Furnace. Hermann Walde. Paper from "A Study of the Iron and Steel Industry in Latin America". v. II. United Nations, p. 167-172.

Characteristics and advantages of electric heating method, study of carbon-bearing materials, fuels, pow-

er and furnace construction and problems of ferro-alloy production. (D1, Fe)

379-D. The Electric Reduction Furnace. Alfonso Ballon. Paper from "A Study of the Iron and Steel Industry in Latin America". v. II. United Nations, p. 172-175.

Power consumption and economic considerations. (D1, D5)

380-D. Operation of the Charcoal Blast Furnace at Corral Using Mixtures of Metallurgical Coke and Charcoal. Danilo Vucetich. Paper from "A Study of the Iron and Steel Industry in Latin America". v. II. United Nations, p. 158-162, 166.

Outline of present and planned operating conditions. (D1, CI)

381-D. Electric Smelting of Pig Iron. M. O. Sem. Paper from "A Study of the Iron and Steel Industry in Latin America". v. II. United Nations, p. 175-178, 180-181.

Data on furnaces in various countries, reduction in power consumption, preheating and prereduction of the charge, the rotating hearth furnace. (D1, CI)

382-D. The Krupp Renn Process. Friedrich Johannsen. Paper from "A Study of the Iron and Steel Industry in Latin America". v. II. United Nations, p. 192-200, 203.

Process is carried out in a rotary kiln. Individual particles of sponge iron are welded together at temperatures from 1200 to 1300° C., whereby larger iron nodules free of slag, called "luppen" are formed. (D8, Fe)

383-D. Production of Sponge Iron According to the Wiberg-Söderfors Method. John Stalhed. Paper from "A Study of the Iron and Steel Industry in Latin America". v. II. United Nations, p. 204-209.

Reduction gas, consisting of carbon monoxide and hydrogen in ratio 2:1, is generated in an electrically heated carburetor, in which the gas fed back from the reduction furnace shaft is brought to react with the fuel. Various ores and reducing agents are discussed. (D8, Fe)

384-D. The Basset Process for the Production of Pig Iron in Rotary Kilns. Knud E. Jensen. Paper from "A Study of the Iron and Steel Industry in Latin America". v. II. United Nations, p. 210-216, 228.

Complete smelting process is carried out in rotary kiln. The kiln, raw materials, advantages and economics of the process are discussed. (D8, CI)

385-D. The Rotary Kiln Processes for Sponge Iron, Developed at the Avesta Iron and Steel Works and the Domnarfvet Iron and Steel Works, Sweden. Bo Kalling. Paper from "A Study of the Iron and Steel Industry in Latin America". v. II. United Nations, p. 216-219, 229.

Furnace construction and production procedures. (D8, Fe)

386-D. Production of Sponge Iron in a Rotary Kiln at Temperatures Below the Fusion Point of the Material. Russell C. Duehl. Paper from "A Study of the Iron and Steel Industry in Latin America". v. II. United Nations, p. 220-228, 229-230.

Process and equipment, review of results, operating data, suitable raw materials, costs. (D8, Fe)

387-D. The Acid Bessemer Process. W. O. Philbrook. Paper from "A Study of the Iron and Steel Industry in Latin America". v. II. United Nations, p. 231-242, 265-266.

Applications, specifications and limitations of bessemer steel, raw materials used in its manufacture, and technology and economics of the process, with reference to current practice in the U. S. (D3, ST)

388-D. Basic Open-Hearth Steelmaking Practice in the United States of America. William C. Buell, Jr. Paper from "A Study of the Iron and Steel Industry in Latin America". v. II. United Nations, p. 242-250.

Charge materials, processing in openhearth furnace, chemistry of process and its product, composition of resulting steel, ingot capacity of the Americas. (D2, ST)

389-D. Economics of the Modern Acid Open-Hearth Practice. G. R. Fitterer. Paper from "A Study of the Iron and Steel Industry in Latin America". v. II. United Nations, p. 251-258.

Recent technological advances have increased method's advantages, among which are reduced costs, little or no ore addition and greater production rate. (D2, A4, ST)

390-D. Manufacture of Thomas (Basic Converter) Steel at Paz de Rio, Colombia. Edouard Decherf. Paper from "A Study of the Iron and Steel Industry in Latin America". v. II, United Nations, p. 259-265.

Presents the main departures from current European Thomas steelmaking practice imposed by local con-

ditions, such as: quality of raw materials, altitude above sea level, size of plant and production program of the rolling mills. (D3, ST)

391-D. Perrin Process for Converter Steelmaking. Marc Allard. Paper from "Study of the Iron and Steel Industry in Latin America". v. II. United Nations, p. 277-282.

Precautions concerning blowing in basic converter process. Rapid refining method. (D3, ST)

392-D. Thomas Steel With Low Nitrogen and Phosphorus Contents. P. Coheur. Paper from "A Study of the Iron and Steel Industry in Latin America". v. II. United Nations, p. 282-289, 291-292.

Indicates that blowing with oxygen-enriched air or with a mixture of oxygen and steam permits production of Thomas steels with exceptionally low nitrogen and phosphorus content. Ductility is excellent and converter capacity is increased. (D3, ST)

393-D. Desulfurization of Pig Iron With Pulverized Lime in Rotary Kilns. Bo Kalling. Paper from "A Study of the Iron and Steel Industry in Latin America". v. II. United Nations, p. 333-337.

Process differs from previous methods in that the pulverized burnt lime does not melt but remains solid during the whole treatment. Rapid and effective desulphurization can be obtained with a low consumption of lime. (D8, CI)

394-D. The Acid Bessemer Process at Huachipate, Chile. Héctor Canguilhem. Paper from "A Study of the Iron and Steel Industry in Latin America". v. II. United Nations, p. 360-363, 367.

Raw materials and specifications, refractory and blowing practices, tapping and late additions, teeming, production tonnages and yields. (D3, ST)

395-D. Continuous Casting of Steel by the Rossi-Junghans Process. T. Y. Wilson. Paper from "A Study of the Iron and Steel Industry in Latin America". v. II. United Nations, p. 368-373.

Equipment and operating procedures. (D9, CI)

396-D. (Czech.) **The Production of Transformer Steel by a Combined Method in Openhearth and Electric-Arc Furnaces.** Karel Hybek and Frantisek Poboril. *Hutnické Listy,* v. 11, no. 9, Sept. 1956, p. 529-532.

Data concerning the influence of different elements on electromagnetic properties of transformer sheets. (D7, P16, AY)

397-D. (Czech.) **Determination of Iron Ore Reducibility.** Frantisek Wald. *Hutnické Listy,* v. 11, no. 9, Sept. 1956, p. 532-536.

Importance of knowing the reducibility of an ore. Work done is on the basis of Kräber-Luyken's method. (D general, Fe)

398-D. (French.) **Improving the Productivity of a Steel Plant Using the Thomas Process, With Wide Bottom Converters.** L. Septier, J. de Hedoubille, P. Leroy and L. de Saint-Martin. *Institut de Recherches de la Sidérurgie, Publications,* ser. A, no. 147, Sept. 1956, p. 1-30. (Reprinted from *Circulaire d'Informations Techniques* du Centre de Documentation Sidérurique, no. 7, July 1956.)

Three types of converters compared. A 30% increase in productivity was obtained by using a large bottom converter with more tuyeres. (D3, ST)

399-D. (French.) **New Converter Designs.** P. Leroy. *Institut de Recherches de la Siderurgie, Publications,* ser. A, no. 146, Sept. 1956, p. 1405-1413. (Reprinted from *Circulaire d'Informations Techniques* du Centre de Documentation Siderurgique, no. 6, July 1956, p. 1405-1413.)

Essential geometrical features of steel works converters: inside lining profile, apron profile, bottom diameters, characteristics of gooseneck, windbox and tuyeres. (D3, ST)

400-D. (French.) **Basic Steel Obtained by Blowing With Oxygen-Carbonic Acid Mixture (Elaboration, Laboratory Tests, Industrial Results).** P. Boutonnet, A. Richard, P. Mathieu and R. Maret. *Revue de Métallurgie,* v. 53, no. 9, Sept. 1956, p. 665-681.

Results with some 50 castings indicate that this steel may be advantageously compared with openhearth steel. (D3, ST)

401-D. (Polish.) **New Results of Investigations of the Process of Ferrous Oxide Reduction by Carbon.** M. S. Kurczatow. *Prace Instytutow Ministerstwa Hutnictwa,* v. 4, no. 8, 1956, p. 169-184.

Studies indicate that reduction by carbon may proceed according to two types of reactions—primary dissociation of oxides under the effect of activated adsorption, or catalytic adsorption reduction of oxides by carbon monoxide which takes place in consequence of chemical adsorption. (D general, Fe, CI)

402-D. (Polish.) **Melting Steel and Alloys in Vacuum.** H. Zakowa. *Prace Instytutow Ministerstwa Hutnictwa,* v. 4, no. 8, 1956, p. 207-214.

Physico-chemical processes which take place during the melting of steel in vacuum, and also during its deoxidation. (D8, ST)

403-D. (Polish.) **The Heating Cycle in Openhearth Furnaces,** Antoni Kolano. *Wiadomosci Hutnicze,* v. 12, no. 9, Sept. 1956, p. 267-271.

Problems of heating the openhearth, and more efficient utilization of fuel. Some of the errors to be avoided. (D2)

404-D. (Swedish.) **The Use of Oxygen in Steel Production.** Folke Johansson. *Jernkontorets Annaler,* v. 140, no. 9, 1956, p. 607-673.

A critical review of the present methods of using oxygen in steelmaking. The new oxygen steel process (the LD process), developed to full-scale production in Austria, also discussed. (D3, ST)

405-D. Sulfur Equilibria Between Gases and Slags Containing FeO. George R. St. Pierre and John Chipman. *Journal of Metals,* v. 8, sec. 1; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Oct. 1956, p. 1474-1483.

Experimental program to determine equilibrium sulfur content in slags exposed to gases of known oxygen and sulphur pressures. (D2)

406-D (Russian.) **The Question of the Movement of Charge in the Blast Furnace.** V. K. Gruzinov. *Stal',* v. 16, no. 9, Sept. 1956, p. 771-773.

Materials descend in the blast furnace because of the coke burning in the tuyere zone, and because of fusion and partial gasification on the way. The braking effect of the bosh is found to be exaggerated. (D1, Fe)

407-D (Russian.) **Advantages of the Tilting Openhearth Furnace Over the Stationary Furnace.** K. G. Trubin, *Stal',* v. 16, no. 9, Sept. 1956, p. 780-782.

A review on the use of tilting furnaces in foreign countries, particularly in Britain and Germany. (D2, Fe)

408-D. (Russian.) **The "Dead" and "Wild" Phases of an Electric-Arc Furnace.** V. F. Ivan'ko. *Stal',* v. 16, no. 9, Sept. 1956, p. 794-797.

Reducing voltage discrepancy between two of the electrodes of a three-phase electric-arc furnace to preserve the lining, accelerate melting, reduce power consumption, and avoid excessive carburization of the metal. (D5, ST)

409-D. (Spanish.) **A Contribution to the Study of Electrolytic Purification of Steels.** José Ibarz Aznarez and Sebastian Feliu Metas. *Revista de Ciencia Aplicada,* v. 10, no. 50, May-June 1956, p. 233-240.

Electrolytic purification of steel in a bath of sulphuric acid, methyl alcohol and ethyl alcohol. Conditions and interpretation of process. (D8, ST)

410-D. (Book.) **Oxygen in Iron and Steel Making.** J. A. Charles, W. J. B. Chater, and J. L. Harrison. 316 p. 1956. Interscience Publishers, Inc., 250 Fifth Ave., New York, N. Y. $6.50.

An exhaustive summary of literature through 1955. Deals with treatment of molten metal with oxygen, blast enrichment with oxygen in solid fuel combustion and flame enrichment. (D general, B22)

411-D. (Book.) **A Study of the Iron and Steel Industry in Latin America. v. I-II. Report on and Proceedings of the Meeting of the Expert Working Group Held at Bogota.** 123 and 449 p. 1954. United Nations, Department of Economic Affairs, New York, N. Y.

Economic status of the industry. Numerous papers dealing with new or experimental processes, both in relation to utilization of available coal reserves and to steelmaking itself. Selected papers individually abstracted. (D general, B general, A4)

SECTION E

FOUNDRY

1-E. Foundry Practice. X. Fettling Operations. William H. Salmon and Eric N. Simons. *Edgar Allen News,* v. 34, Oct. 1955, p. 231-232.

Chipping, burning-off, grinding, rumbling, shot blasting and hydroblast. (To be continued.) (E24)

2-E. Chemical Reactions in the Cupola. G. A. H. Jungbluth and K. Stockkamp. *Foundry Trade Journal,* v. 99, Oct. 13, 1955, p. 405-411.

Experiments show effect of hot blast on combustion temperature of coke, combustion ratio, iron temperature, iron oxide and on silicon, manganese, phosphorus and sulfur content. Graphs, tables. 6 ref. (E10, Fe)

3-E. Moulding in an Indian Foundry. S. G. Athanikar. *Foundry Trade Journal,* v. 99, Oct. 20, 1955, p. 431-436; disc., p. 436-438.

Facilities of one company, procedures for molding four typical castings of medium-to-large weight range. Photographs, diagrams. (E19)

4-E. Development of an Improved Method for Cupola Charging to Meet Increased Production Requirements. Harry G. McCallum. *General Motors Engineering Journal,* v. 2, Nov.-Dec. 1955, p. 14-19.

Principle based on a delayed action electromagnetic metallic charge make-up equipment and skip charger method which has eliminated much human effort. Diagrams. (E10, CI)

5-E. Casting Magnesium for Supersonic Aircraft. William Helme. *Industrial Gas,* v. 34, Oct. 1955, p. 3-5.

Work of the Howard Foundry Co. of Chicago, an organization that stayed with magnesium after World War II. Photographs. (E general, Mg)

6-E. Magnesium Progress in France. *Light Metals,* v. 18, Oct. 1955, p. 336-337.

Capacity and foundry practices of one plant. Photographs. (E general, Mg)

7-E. Some Factors Relating to the Effective Operation of Die Casting Dies. H. K. Barton and L. C. Barton. *Machinery (London),* v. 87, Oct. 28, 1955, p. 1027-1034.

Die changing between shifts, preventive maintenance, inspection of sample castings and replacement parts. Graphs, table. (E13)

8-E. Investment Castings: 4% Carbon Shot Controls Melt Chemistry. W. F. Carn and D. F. Mika. *Modern Castings and American Foundryman,* v. 28, Nov. 1955, p. 34-35.

Shot permits closer control than other forms of melting stock and reduces amount and number of necessary additions. Table, photograph. (E15, CI)

9 E. How to Save $½ Million. A. J. Carah. *Modern Castings and American Foundryman,* v. 28, Nov. 1955, p. 36-40.

Premium casting replaces machined missile part. Diagrams, graphs, photographs, tables. (E11)

10-E. Special Cupolas and Accessories. *Modern Castings and American Foundryman,* v. 28, Nov. 1955, p. 41-46.

Developments are overcoming past deficiencies and are resolving problems created by castings buyer demands. Photographs, diagrams. (E10)

11-E. Looking into the Heart of a Mold. V. D. Frechette. *Modern Castings and American Foundryman,* v. 28, Nov. 1955, p. 58-62.

How polarizing and stereoscopic microscopes identify and analyze molding materials and define their textural characteristics. Diagrams, graphs, photographs. 25 ref. (E18, S11)

12-E. (Dutch.) **The Application of Alloyed Steel in Precision Casting.** H. J. Meerkamp van Embden. *Metalen,* v. 10, no. 18, Sept. 30, 1955, p. 381-386.

Various casting methods, melting, risers and types of parts. Photographs. (E15, AY)

13-E. (French.) **Prerefining Cast Iron in the Ladle by Means of Pure Oxygen. Results Obtained in a Pilot Plant.** P. Leroy and L. Septier. *Institut de recherches de la sidérurgie, Publications,* ser. A, no. 101, July 1955, 175 p.

Process, variations and results of primary desilication of cast irons by injecting pure oxygen into the cast iron in ordinary steel mill or blast-furnace ladles. Tables, diagrams, graphs. 12 ref. (E25, D1, CI)

14-E. (German.) **Ideas for Classification of Iron-Carbon Casting Alloys.** Adelbert Wittmoser. *Giesserei,* v. 42, no. 21, Oct. 13, 1955, p. 573-580.

Necessity of establishing norms, classification of alloys with spheroidal graphite formation, related problems. Diagrams, micrographs, graphs, tables. 44 ref. (E general, S22, CI)

15-E. (German.) **Tests in Basic Cupola Furnace With Hot Blowing and Coating Coke With a Crust.** Martin Georg Fronberg and Willi Döbber. *Giesserei,* v. 42, no. 21, Oct. 13, 1955, p. 580-585.

Investigation of coating the coke with portland cement crust and its relation to desulfurization of cast iron. Diagram, graphs, photograph, tables. 22 ref. (E10, CI)

16-E. (Japanese.) **Basic Experiments in Connection With Gas-Type Casting (the CO_2 Process).** Kazuo Shikatori. *Metals (Japanese),* v. 25, no. 10, Oct. 1955, p. 725-729.

Sand properties, methods of introducing gas, compression strength and gassing time, types of compacts and binder contents, molds and cores. Graphs, photographs, diagram. 10 ref. (E18, E11, CI)

17-E. (Swedish.) **Theories of Bonding Forces of Clays With Particular Reference to *p*H-Control of Molding Sands.** M. Itzel. *Gjuteriet,* v. 45, no. 9, Sept. 1955, p. 123-128.

Effect of constitution and forces acting between clay particles on properties of clays in molding sands. By *pH* control, the properties of the molding sand can be changed. Photographs, graph, diagrams. 14 ref. (E18)

18-E. **A New Coremaking Practice.** F. Brunn. *Henry Brutcher Translation No.* 3614, 11 p. (Abridged from *Metallurgie und Giessereitechnik,* v. 4, no. 3, 1954, p. 113-116.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 322-E, 1954. (E19)

19-E. **Coremaking With Waterglass and Carbon Dioxide in the Gray-Iron Foundry.** F. Naumann. *Henry Brutcher Translation No.* 3615, 4 p. (Abridged from *Metallurgie und Giessereitechnik,* v. 4, no. 3, 1954, p. 116-117.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 333-E, 1954. (E21, CI)

20-E. (Czech.) **Comparative Study of Materials and Casting Methods for Piston Rings.** Vaclav Oliverius. *Slévarenstvi,* v. 3, no. 10; *Prace Ceskoslovenského vyzkumu slévarenskeho,* v. 2, no. 24, Oct. 1955, p. 161-168.

Properties and structure of various cast irons and cast steel formed by stationary and centrifugal casting. (E11, E14, Q general, CI)

21-E. (Czech.) **Contribution to the Production of "Pyroferal" Castings.** Zdenek Eminger. *Slévarenstvi,* v. 3, no. 10, Oct. 1955, p. 309-317.

Melting, choice of charge, pouring, contraction, molding sands and technique, and gating systems for production of aluminum-iron alloys castings. Photographs, diagrams. (E11, Al, Fe)

22-E. (Czech.) **Foundry Mechanization in the Soviet Union.** Bohumil Hornicek. *Slévarenstvi,* v. 3, no. 10, Oct. 1955, p. 317-321.

The author, who recently visited the Soviet Union, shows examples of how even older foundries are mechanized in the Soviet Union and describes the organization of work in these factories. Diagrams. (E general, CI)

23-E. (Czech.) **Contribution to the Theory and Practice of Atmospheric Risers.** Miroslav Houst. *Slévarenstvi,* v. 3, no. 10, Oct. 1955, p. 322-324.

Processes occurring in the atmospheric riser during solidification, with special attention to the question whether the core, on heating should develop more gas and whether the gas should freely leave the riser. Diagram, photographs. 1 ref. (E22, E25)

24-E. (Hungarian.) **Centrifugal Casting of Steel.** Herbert Hartmann and Tamas Ko. *Öntöde,* v. 6, no. 10, Oct. 1955, p. 225-236.

Comparative quality of centrifugal and stationary castings. Diagrams, photographs, tables, micrographs. (E14, CI)

25-E. Gas Porosity and Non-Metallic Inclusions in Aluminum Alloys. Jack Morgan. *Canadian Metals,* v. 18, Nov. 1955, p. 26-28, 30.

Techniques for correcting defects in aluminum alloy castings. Photographs. (E25, Al)

26-E. Gating and Risering of Non-Ferrous Castings. Alan R. Moore. *Canadian Metals,* v. 18, Nov. 1955, p. 33-34, 36.

Advice on positioning, pouring, temperatures and production planning for good gating. (E22)

27-E. Shell Moulding in Canada. E. W. Chapman. *Canadian Metals,* v. 18, Nov. 1955, p. 39-40, 44.

Advantages and techniques of shell molding. Photographs. (E16)

28-E. Pouring Practice in the Brass Foundry. Harry St. John. *Foundry,* v. 83, Dec. 1955, p. 90-93.

Important factors are cleansing of molten metal, proper pouring temperature, correct care of the ladle. Photograph, diagrams. (E23, Cu)

29-E. Small Steel Foundry Produces Specialty Castings. Edwin Bremer. *Foundry,* v. 83, Dec. 1955, p. 94-97.

Plant layout and operating procedure of Waunakee Alloy Casting Corp., including floor plan. Photographs. (E general, CI)

30-E. Shell Cores—Their Production and Application. Ray Olson. *Foundry,* v. 83, Dec. 1955, p. 108-112.

Development of shell cores gives greater molding accuracy and smooth castings. Photographs. (E21, E16)

31-E. Hot Strength of Clay-Bonded Sands. W. B. Parkes. *Foundry,* v. 83, Dec. 1955, p. 113-119.

Properties and influence of various additives measured to test behavior of sand in the mold. Graphs, table. 5 ref. (E18)

32-E. Patterns Cast in Epoxy Resin. D. B. Orr. *Foundry Trade Journal,* v. 99, Nov. 10, 1955, p. 531-536.

Details of the adaptation of a simple process to meet diverse pattern requirements, using a material that presents no shrinkage problems. Photographs. (E17)

33-E. A Jobbing Investment Foundry in South Africa. J. Steele. *Foundry Trade Journal,* v. 99, Nov. 17, 1955, p. 561-572.

Facilities, brief outline of its five-year history. Photographs. 3 ref. (E15, A5)

34-E. Development of the Lost-Wax Process of Precision Casting, 1949-53. J. S. Turnbull. *Institution of Mechanical Engineers, Proceedings,* v. 169, no. 17, 1955, p. 319-325 + 12 plates; disc., p. 325-330.

Limitations of original lost-wax process and improved methods by which the process has extended its application in industry. Economics considered and the scale of manufacture reviewed with a view to mechanization. Diagrams, photographs. (E15)

35-E. Low-Pressure Casting of Steel in Graphite Moulds. H. H. Hursen. *Machinery (London),* v. 87, Nov. 18, 1955, p. 1187-1192.

Mold construction and casting methods. Diagram, photographs. (E12, CI)

36-E. The A.P.V.-Paramount Shell Moulding Foundry. *Machinery (London),* v. 87, Nov. 25, 1955, p. 1224-1232.

Layout of mold-making unit, core blowing unit, vacuum-type shell-closing machine, pattern plates and method of pouring. Machining economies. Photographs, diagram. (E16, G17, SS, Al, Cu)

37-E. Pressure Die Casting of Aluminium Alloys. *Machinery (London),* v. 87, Nov. 25, 1955, p. 1251-1257.

Practice at the works of Wolverhampton Die-Casting Co., Ltd. Deals with dies for office machine part and roller bearing cage, signalling lamp castings, refrigerator control body castings, drill gun castings. Photographs. (E13, Al)

38-E. American Turbine Blade Production Has Developed Its Own Methods. II. *Metalworking Production,* v. 99, Nov. 18, 1955, p. 1937-1942.

Fabrication by forging and investment casting. Describes new material developments in plastics and cermets. Photographs. (E15, F22)

39-E. Coreless Mains Frequency Melting Is Revived. F. S. Leigh. *Metalworking Production,* v. 99, Nov. 25, 1955, p. 2004-2007.

Design and operating characteristics of induction furnace for cast iron melting. Photographs, diagrams, graphs. (E10, CI)

40-E. Die Casting Magnesium at McCulloch Motors. Sherwood H. Egbert. *Modern Metals,* v. 11, Nov. 1955, p. 44 + 7 pages.

Machines and operating procedures for making parts for chain saws and other equipment. Photographs, diagram. (E13, Mg)

41-E. Influence of Metallurgical Properties of Cast Steel on Tendency to Hot Tearing. H. Heyer and E. Piwowarsky. *Henry Brutcher Trans-*

lation No. 3539. 16 p. (Abridged from *Giesserei,* v. 42, no. 11, 1955, p. 273-279.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 289-E, 1955. (E25, CI)

42-E. (French.) **Solidification of Light Alloys. Study of Piping.** André Tatur. *Fonderie,* 1955, no. 116, Sept., p. 4681-4692.

Morphological characteristics of aluminum alloys with copper, silicon and magnesium; influence of foundry factors on the piping shape using cone-shaped specimens. Photographs, diagrams. 7 ref. (E25, Al)

43-E. (French.) **Cupola Coke.** Maurice Decrop. *Fonderie,* 1955, no. 116, Sept., p. 4693-4698.

Quality criteria for foundry cokes, sampling, and mechanical tests. Table. 21 ref. (E10, B18)

44-E. Large Die-Castings. H. K. Barton. *Metal Industry,* v. 87, Nov. 11, 1955, p. 405-408.

Description and use of large 72-in. die-casting machine. Diagrams, table, photograph. (E13)

45-E. (German.) **Classification and Applicability of Core Binder in Foundry Work.** Reinhard Grochalski. *Giessereitechnik,* v. 1, no. 4, Apr. 1955, p. 35-41.

Properties, application and characteristics of emulsion, oil, resin and dry binders. Suggests new classification of the latter. Tables, graph, photographs. 8 ref. (E18)

46-E. (German.) **Chilled Balls for Ball-Mills.** Edwin Bakovsky. *Giessereitechnik,* v. 1, no. 4, Apr. 1955, p. 42-46.

Experimental data for casting balls with a diameter up to 100 mm. Graphs, photographs, micrographs, maps. 4 ref. (E12, CI)

47-E. (German.) **X-Ray Microstructure Analysis and Its Application in Tests of Molds and Accessory Foundry Material.** Marianne Weidner. *Giessereitechnik,* v. 1, no. 5, May 1955, p. 64-68.

Fundamentals and application of X-ray analysis, especially the Debye-Scherrer method, and its use in foundry testing. Particular attention given to testing clay sedimentation materials. Diagrams, diffractograms. 3 ref. (E18, M22)

48-E. (German.) **Basket Box System of Mold-Making.** H. Koltz. *Giessereitechnik* v. 1, no. 5, May 1955, p. 73-74.

Basket mold construction, application and its advantages over regular mold making methods. Diagrams, photographs. (E19)

49-E. (German.) **Tin Economy Through Replacement by High-Quality Copper Alloys With Low Content of Critical Materials.** Helmut Ohmann. *Giessereitechnik,* v. 1, no. 6, June 1955, p. 96-101.

Comparative review of different substitution alloys, their composition, mechanical characteristics and smelting properties in the casting of various types of bronzes and brasses. Tables. (E general, Sn, Cu)

50-E. (German.) **The Knock-Out Riser in Light-Metal Casting.** Marion Pasternak. *Giessereitechnik,* v. 1, no. 6, June 1955, p. 102-103.

Evaluates applicability of a riser similar to that used in iron casting. Photographs. (E22, EG-a)

51-E. (German.) **Cast Steel by Chill Molding.** Wolfgang Kilian and Wolfgang Kaiser. *Giessereitechnik,* v. 1, no. 7, July 1955, p. 116-120.

Review of contemporary literature. Tables, graph, diagrams, photographs. 5 ref. (E general, CI)

52-E. (German.) **Melting Operations in Gray Iron Casting.** Gustav Speer. *Giessereitechnik,* v. 1, no. 9, Sept. 1955, p. 166-168.

Dimensional data of gray iron cupola furnaces, lining techniques, melting process observation, description of air blast and electric furnaces. Table, graph, diagrams. 6 ref. (E10, CI)

53-E. Chevrolet Foundry Has Newest Automatic Equipment. Thomas Mac New. *Automotive Industries,* v. 113, Dec. 15, 1955, p. 50-52.

Equipment, layout and procedures. Among outstanding features are six Grindle cupolas equipped with capped exhaust systems and automatically controlled by a central, single-board panel operated by one worker; specially designed hangers for overhead conveyors; new-type fume and dust collecting machinery. Photographs, diagrams. (E general, CI)

54-E. Foundry Practice. Willam H. Salmon and Eric N. Simons. *Edgar Allen News,* v. 34, Dec. 1955, p. 276-277.

Salvaging of castings, defects in castings and heat treatment. Diagram, micrograph. (To be continued.) (E25)

55-E. Down Come Aluminum Casting Costs. W. G. Patton. *Iron Age,* v. 176, Dec. 29, 1955, p. 61-64.

New casting method process produces castings of a few ounces up to 70 lb. successfully and economically. Castings are accurate, free from porosity, uniformly finished. Photographs, table. (E12, Al)

56-E. Diecasting Dies: The Stacking-Unit System. Hiram K. Barton. *Mechanical World and Engineering Record,* v. 135, Dec. 1955, p. 550-552.

Novel type of unit die with greater capacity that is quicker to set up and dismantle. Diagrams. 2 ref. (E13)

57-E. Moulding Machines. J. B. McIntyre. *Metal Industry,* v. 87, Dec. 9, 1955, p. 483-486.

Classification and characteristics of major types of machines. Diagrams, photographs, table, graph. (To be continued.) (E19)

58-E. Plastic or Metallic? How to Choose the Correct Sealant When Impregnating Porous Castings. D. W. Holmes. *Modern Metals,* v. 11, Dec. 1955, p. 54, 56, 58.

Compares three metallic and one plastic impregnation method, giving procedures, cost of equipment and sealant required and advantages of each method for specific type of porosity. Diagrams, table, photograph. (E25)

59-E. Close Symmetry Held in a 17-Pound Stainless Steel Wedge. *Precision Metal Molding,* v. 13, Dec. 1955, p. 45-46, 80.

Shell mold casting solves production problem. Photograph. (E16, SS)

60-E. (Czech.) **Grain Refining of Magnesium Alloys.** Ladislav Kubicek. *Hutnické listy,* v. 10, no. 11, Nov. 1955, p. 651-654.

Effect of additions of calcium or calcium carbonate to alloys of magnesium with manganese or aluminum. Tables, photographs, X-ray patterns. 5 ref. (E25, Mg)

61-E. (Czech.) **Casting in Permanent Molds Decreases Production Costs.** Rudolf Koula. *Slévarenstvi,* v. 3, no. 2, Nov. 1955, p. 341-343.

Advantages of permanent mold casting. Castings adapted to permanent mold production. Factors governing choice of type of mold. 4 ref. (E12)

62-E. (Czech.) **Contribution to the Testing of Molding Materials. I. Preparation of Test Pieces, Permeability, Strength.** Ladislav Jenicek. *Slévarenstvi,* v. 3, no. 2, Nov. 1955, p. 343-352.

Compacting and strength tests of molding sands. Ramming tests of small specimens. Photographs, diagrams, graphs, tables. 11 ref. (E18)

63-E. (Czech.) **Production of Cylinders With Cooling Ribs in Shell Molds.** Rudolf Kloda. *Slévarenstvi,* v. 3, no. 2, Nov. 1955, p. 352-356.

Methods, equipment and materials for producing molds and castings. Analyses of causes of defects in castings. Photographs, table, diagram. (E16)

64-E. (Czech.) **Mixtures for the Insulation of Risers.** Robert Kamensky and Antonin Kubacky. *Slévarenstvi,* v. 3, no. 2, Nov. 1955, p. 356-359.

Test was devised for measuring insulating power of various mixtures. Cupola flue dust was found to have good insulating properties. Photographs, tables, graphs. 13 ref. (E22)

65-E. (Czech.) **Moisture and Patterns.** Milan Malek. *Slévarenstvi,* v. 3, no. 2, Nov. 1955, p. 359-362.

Improvement of stability of wood patterns by air conditioning the pattern shops, kiln drying the wood, and/or impregnation and coating procedures. Graphs, diagrams. (E17)

66-E. (German.) **Relation Between the Mold Composition and the Teeming Ability and Cracking of Cast Steel.** Friedrich-Karl Althof and Rudolf Radtke. *Giessereitechnik,* v. 1, no. 7, July 1955, p. 111-115; no. 8, Aug. 1955, p. 136-144.

Relationship between different binding materials in molding sand, amount and type of alloying elements, other factors in cast steel, in respect to its cracking tendency. Tables, graphs, diagrams, photographs, maps. 36 ref. (E19, E23, CI)

67-E. (German.) **Application of Intensified Gas Pressure by Use of a Cartridge in Casting.** *Giessereitechnik,* v. 1, no. 7, July 1955, p. 123-124.

Method of pressure casting by use of chalk, coke, charcoal and a water cartridge inserted in the mold above the cast metal level. Table, diagrams. 3 ref. (E13)

68-E. (German.) **Formation of Tin Scales on Cast Bronze and Red Brass.** Edmund R. Thews. *Giessereitechnik,* v. 1, no. 9, Sept. 1955, p. 162-165.

Theoretical explanation of the phenomenon, its possible causes and suggestions for its elimination. Tables, graph, diagram, map. 4 ref. (E25, Cu, Sn)

69-E. (Russian.) **Making Hollow Cores in Small-Scale Production.** M. I. Rotenberg, V. I. Soldatenko and A. P. Shkarin. *Litcinoe proizvodstvo,* 1955, no. 10, Oct., p. 1-3.

Application of casing molds for small-scale mass casting. It is very economical for production line use, as well as for small-scale operation. Details of mechanization of the process. Tables, diagrams, photograph. (E21, CI)

70-E. (Russian.) **Experience in Utilization of Fast Drying Mixtures.** F. I. Kotik. *Liteinoe proizvodstvo,* 1955, no. 10, Oct., p. 3-6.

Fast-drying mold materials, their chemical-mineralogical composition and physical data. Tables, graphs. 4 ref. (E18)

71-E. (Russian.) **Casting of Iron Parts for Large Lathes.** N. I. Averbukh. *Liteinoe proizvodstvo,* 1955, no. 10, Oct., p. 6-10.

Technique of casting heavy parts of large lathes and materials used in the process. Tables, diagrams. (E11, CI)

72-E. (Russian.) **Machine Tool for Pressure Casting Model 515.** D. M. Litvin. *Liteinoe proizvodstvo,* 1955, no. 10, Oct., p. 13-17.

Construction details of a machine for casting nonferrous metals and their alloys under pressure, including production data. Tables, diagrams. 4 ref. (E13, EG-a)

73-E. (Swedish.) **Some Aspects on the Use of Strainer Cores and a Draft Standard for Ceramic Strainer Cores.** G. Fernheden and K. Akesson. *Gjuteriet,* v. 45, no. 11, Nov. 1955, p. 157-164.

Form and dimensions of strainer cores, their ceramic composition and design of the gating system. A draft standard for eight round and two rectangular ceramic strainer cores with sizes from 1.5 to 8 cm^2 effective area presented. Photographs, diagrams, tables. 2 ref. (E21, E23)

74-E. Low Cost Gas Turbine Blades a Must for Automobile Use. Donald N. Frey. *Automotive Industries,* v. 114, Jan. 1, 1956, p. 52-53, 109-110.

Low-cost investments and elimination of wax or plastic patterns appears to partially answer the problems involved in producing inexpensive but suitable parts. Photographs. (E15, Al)

75-E. Huge Increase in Investment Castings for Turbojets. Dean K. Hanink. *Automotive Industries,* v. 114, Jan. 1, 1956, p. 58-59, 112-113.

Investment parts are presently used in the hot end of the gas turbine, primarily as larger structural components. Photographs, graph, flow diagram. (E15)

76-E. Nomogram for Fairly-Hot Non-Alloyed Iron Cast In Ordinary Dry-Sand Moulds. Sv. Thegel. *Foundry Trade Journal,* v. 99, Dec. 8, 1955, p. 661-670.

Attempt to combine, in one diagram, composition, hardness and thickness factors for cast iron and their inter-relation with one another, to furnish a method of computing a composition which will provide the properties required in a casting. Graphs, tables. 9 ref. (E11, CI)

77-E. Modern Patternmaking Establishment. *Foundry Trade Journal,* v. 99, Dec. 8, 1955, p. 675-678.

Description of new works of Universal Pattern Co. (London) Ltd. Photographs. (E17)

78-E. Gases in Cast Iron. H. Morrogh. *Foundry Trade Journal,* v. 99, Dec. 22, 1955, p. 723-735.

Examination of techniques employed for determination of gaseous elements in cast iron and for sampling of cast irons for these determinations. Diagrams, micrographs, photograph, tables. (To be continued.) (E25, CI)

79-E. Ingates. *Foundry Trade Journal,* v. 99, Dec. 15, 1955, p. 691-702; disc., Dec. 22, 1955, p. 737-742.

Summary of factors affecting flow through channels carrying the metal to the casting. Diagrams, photographs, tables. 25 ref. (E22)

80-E. Continuous Aluminum Melting Furnace Improves Permanent Mold Casting. A. A. Furczyk. *Industrial Heating,* v. 22, Dec. 1955, p. 2486 + 5 pages.

By eliminating wasteful heating of heavy equipment and large reserves of aluminum, use of an automatic furnace has brought about improved quality of castings, stabilization of production rate, control of foundry costs. Photographs, micrographs, diagrams. (E10, E12, Al)

81-E. GE Remolds a Foundry. *Steel,* v. 138, Jan. 9, 1956, p. 60-61.

Automation in foundry, casting cycles for large and small castings. Photographs. (E general, A5)

82-E. (Hungarian.) **Industrial Experiments With the Production of Spheroidal Graphite Machine Castings. II.** Miklos Cseh. *Ontöde,* v. 6, nos. 11-12, Nov.-Dec. 1955, p. 274-283.

Properties and heat treatment of annealed cast irons, effects of slags, economic considerations. Diagrams, tables, micrographs, graphs. 11 ref. (E general, J general, Q general, CI)

83-E. Frozen-Mercury Patterns. Irvin D. Kramer. *Aircraft Production,* v. 17, Dec. 1955, p. 494-497.

Use of frozen mercury for patterns in precision casting offers advantages of low volumetric change in melting and a high rate of self-diffusion which gives it the property of self-welding. Quite large investment castings can be made by using the frozen-mercury process and

very complex internal forms, passages and undercuts can be produced. This property makes it possible to eliminate much complex machining and finishing. Photographs, diagrams. (E15, Ni)

84-E. Induction Melting. F. S. Leigh. *Metal Industry,* v. 87, Dec. 16, 1955, p. 503-506.

Differences arising from the application of a mains frequency supply at 50 or 60 cycles for energizing the furnace instead of using a frequency of 500 cycles or over. Diagrams, photographs, graphs. (E10, Al, Cu, Fe, Ni, Cr, AY)

85-E. Moulding Machines. J. B. McIntyre. *Metal Industry,* v. 87, Dec. 16, 1955, p. 506-507.

Description and general survey of the various types of molding machines. Assessment of the main feature of each type. Photographs. (E19)

86-E. We Had To Be Taught How To Use Investment Castings. Carl Benson. *Precision Metal Molding,* v. 14, Jan. 1956, p. 38-40, 79.

Investment casting reduces manufacturing costs and gives designer a degree of freedom not possible by other manufacturing methods. Photographs. (E15)

87-E. Vacuum Die Casting. . .A Progress Report. *Precision Metal Molding,* v. 14, Jan. 1956, p. 45-46.

Review of advantages of a new process by which zinc alloy castings are produced under vacuum. Photographs. (E13, Zn)

88-E. Quality Control of Investment Castings. Charles Yaker. *Precision Metal Molding,* v. 14, Jan. 1956, p. 47, 79-80.

Eight control requirements which must be agreed upon by buyer and vendor to produce aircraft quality investment castings. (To be continued.) (E15, S general)

89-E. Permanent Mold. . .Casting Process With a Future. *Precision Metal Molding,* v. 14, Jan. 1956, p. 48-51.

Reasons for increased use and advantages of this process. Photographs. 4 ref. (E12)

90-E. Expendable Pattern Materials for Investment Casting. C. D. Murphy, Jr. *Precision Metal Molding,* v. 14, Jan. 1956, p. 52-54, 82-85, 89-90.

Technical report on properties and characteristics of waxes. Graphs, photographs, tables. (E15)

91-E. (French.) Production of Dense Pieces in Light Alloy. *Fonderie,* 1955, no. 118, Nov., p. 4786-4787.

Choice of alloy, preparation, molding, inspection, repair. 2 ref. (E general, EG-a)

92-E. (French.) Chill Casting of Brass. Preparation of the Alloy. *Fonderie,* 1955, no. 118, Nov., p. 4788-4789.

Composition of brasses; calculation of zinc addition. (E11, Cu)

93-E. (French.) Precision Casting, a Competitor of Machining. K. W. Heimann. *Métallurgie et la construction mécanique,* v. 87, no. 11, Nov. 1955, p. 875 + 5 pages.

Comparative review of the lost wax, Croning and Shaw processes. Photographs, graph. (E15)

94-E. (German.) Experience With Hot Blast Cupola Furnace in the Foundry. W. Heinrichs and W. Brüker. *Technische Mitteilungen Krupp,* v. 13, no. 6, Oct. 1955, p. 122-132.

Determination of thermal balance; application of recuperator's excess top gases; physical and chemical investigation of properties of pig iron smelted under basic slag; solubility of iron in relation to hydrogen, oxygen, CO and CO_2; nitrogen gases; basicity of slag. Graphs, photographs, table, diagram. 11 ref. (E10, CI)

95-E. (Italian.) Addition by Immersion in Foundry Practice. *Fonderia,* v. 4, no. 10, Oct. 1955, p. 477-484.

Method for adding magnesium powder to cast iron melts for desulfurization forming 100% nodular cast iron. Tables, diagrams, graphs. (E25, CI, Mg)

96-E. (Italian.) Synthetic Molding Sands in the Foundry. G. C. de Angelis. *Fonderia,* v. 4, no. 11, Nov. 1955, p. 503-515.

Describes sand base, bentonite and preparation, properties and characteristics of synthetic molding sand. Photographs, micrographs, diagrams, graphs. 13 ref. (E18)

97-E. Electric Furnace Melting of Copper. G. J. Brittingham. *Australasian Engineer,* 1955, Nov., p. 58-62, 73-74.

Reasons for the trend towards the use of electric furnaces in the melting of copper; suitable types of furnaces. A brief history of development is traced through a review of various installations. Diagram, graphs, tables. 12 ref. (E10, CU)

98-E. An Introduction to Shell Moulding. W. A. Cleary. *Australasian Engineer,* 1955, Nov., p. 63-68.

Fundamentals and development. Evaluates process from foundryman's viewpoint, appraises published literature on the subject. Photographs. 17 ref. (E16)

99-E. Recent Developments in the CO_2 Process. Waldemar Schumacher. *Foundry,* v. 84, Jan. 1956, p.88-93.

Results of studies of thermal conductivity, gas evolution, collapsibility and rinse of sand bonded by carbon-dioxide gas. Graphs, photographs. 4 ref. (E18)

100-E. Modern Facilities Incorporated in New British Foundry. Vincent Delport. *Foundry,* v. 84, Jan. 1956, p.94-99.

Modern foundry planned to produce 240 tons of castings per week. The plant is noteworthy for its efficient layout, ample space, good lighting and ventilation. Photographs. (E general, A5)

101-E. Casting Facilities Prominent in New Westinghouse Pilot Plant. Kenneth L. Mountain. *Foundry,* v. 84, Jan. 1956, p. 100-103.

Shell mold and investment casting facilities are prominent part of a newly completed metals processing laboratory. Photographs. (E16, E15)

102-E. Medium-Size, High-Production Foundry Makes Meter Castings. Robert H. Herrmann. *Foundry,* v. 84, Jan. 1956, p. 104-108.

High-production foundry making brass and aluminum castings used in heating equipment and in meters for handling various liquids. Photographs. (E general, Al, Cu)

103-E. Patterns for Thin-Wall Castings. R. H. Weston. *Foundry,* v. 84, Jan. 1956, p.109

New low-cost method applicable to both simple and complex type of patterns. Diagrams. (E17)

104-E. Fluidity of Molten Cast Iron. E. R. Evans. *Foundry Trade Journal,* v. 99, Dec. 29, 1955, p. 757-763.

Methods used and main points emerging from investigation of the fluidity; significance of results to foundryman. Graphs, diagrams, photograpns, tables. 3 ref. (E25, CI)

105-E. Gases in Cast Iron. H. Morrogh. *Foundry Trade Journal,* v. 99, Dec. 29, 1955, p. 765-773.

Results from studies of the effect of varying oxygen and nitrogen contents of commercial melts. Graphs, micrographs, photographs, tables. 33 ref. (E25, CI)

106-E. Can Precision Casters Meet Gas Turbine Needs? *Iron Age,* v. 177, Jan. 12, 1956, p. 80-82.

Problems and requirements of casting as a production method for turbine parts. Photographs. (E15)

107-E. Does Sand Testing Give Us the Facts? J. S. Schumacher, E. H. King, and R. W. Heine. *Modern Castings,* v. 29, Jan. 1956, p. 30-33.

Suggests reducing weight of rammer used in laboratory testing of molding sands to produce hardness approximating that of molds produced in foundry by jolting or squeezing. Photograph, table, graphs. (E18, E19)

108-E. Direct Arc Furnace Doubles in Bronze. T. R. Stanley. *Modern Castings,* v. 29, Jan. 1956, p. 34-35.

Methods for using same electric steelmaking furnace for producing bronze castings as well as steel. Advantages stated. Table, photographs. (E10, D5, ST, Cu)

109-E. Case Study Report on 3 Small Gray Iron Shops. *Modern Castings,* v. 29, Jan. 1956, p. 41-56.

Condensation of U. S. Department of Labor study of typical small foundries. Covers three foundries employing 53, 47 and 53 workers respectively, describing methods of operation of each, problems encountered, how these problems are handled. Tables, diagrams, photograph. (E general, CI)

110-E. How to Make Duplicate Patterns With Epoxy Resins. Steven P. Kish. *Tool Engineer,* v. 36, Jan. 1956, p. 85-87.

Epoxy patterns offer large savings in time and money, result in ease of handling and storing both the raw materials and finished molds. Diagrams, photograph. (E17)

111-E. Centrifugal Casting of Tubular Steel Shapes. F. Wiesner. *Henry Brutcher Translation No.* 3576, 12 p. (From *Slévarenstvi,* v. 3, no. 2, 1955, p. 44-47.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 180-F, 1955, (E14, CI)

112-E. Operation of the Hot-Blast Cupola. W. Haas. *Henry Brutcher Translation No.* 3581, 7 p. (Abridged from *Giesserei,* v. 42, no. 11, 1955, p. 291-292.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 292-E, 1955. (E10, CI)

113-E. Experimental Application of Waterglass When Making Foundry Molds. P. I. Shportenko. *Henry Brutcher Translation No.* 3622, 6 p. (From *Liteinoe proizvodstvo, 1953,* no. 8, p. 17-18.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 98-E, 1954. (E19)

114-E. Hot Tearing Tendency of Austenitic Manganese Cast Steel From Remelt Heats. F.-C. Althof. *Henry Brutcher Translation No.* 3629, 24 p.

(Abridged from *Giesserei*, v. 42, no. 14, 1955, p. 362-370.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 319-E, 1955. (E10, E25, CI)

115-E. Degassing of Metal Melts by Vacuum Treatment. O. Winkler. *Henry Brutcher Translation No.* 3634, 17 p. (Condensed from *Vakuum-technik*, v. 3, no. 5, 1954, p. 87-96.) Henry Brutcher, Altadena, Calif.

Reviews theory, equilibria and reaction rates, and results in deoxidizing copper. Tables, graphs, diagrams, photograph. 8 ref. (E25, C25, Cu)

116-E. (French.) **Foundry Defects.** J. Pascal. *Métallurgie et la construction mécanique*, v. 87, no. 12, Dec. 1955, p. 959, 961.

Identification and classification of different types of defects. (To be continued.) (E general)

117-E. (German.) **Investigation of Plasticity Measurement of Non-Compressed Molding Sand.** Heinz Siegel. *Giesserei*, v. 42, no. 25, Dec. 8, 1955, p. 686-691.

Plasticity measured by a plasticimeter which determined kneading properties of the sand. Graphs, diagram. 2 ref. (E18)

118-E. (German.) **Behavior of Steel During Solidification.** Werner Trommer. *Giesserei*, v. 42, no. 26, Dec. 22, 1955, p. 708-715.

Behavior after casting, means of control for desired solidification. Tables, graphs, diagrams, photographs, X-ray pictures. 42 ref. (E25, CI)

119-E. (Russian.) **Obtaining High-Quality Cast Iron From the Cupola.** I. B. Khazan. *Liteinoe proizvodstvo*, 1955, no. 11, Nov., p. 4-7.

Regulation of melting process, desulfurizing and degasifying components of the slag, analysis of slags of various types and at various stages of the process, temperature control. Tables, diagrams. (E10, CI)

120-E. (Russian.) **Use of Scrap Cast Iron in the Charge of Malleable Cast Iron.** A. P. Shakhov and S. S. Krasnovskaia. *Liteinoe proizvodstvo*, 1955, no. 11, Nov., p. 25-27.

Chemical composition, mechanical properties, and microstructure compared for usual malleable cast iron and that with scrap cast iron in charge. Better control of silicon content, less rejects, other advantages when this charge is used. Graphs, tables, micrographs. (E10, CI)

121-E. (Swedish.) **Buildings for Melting Departments.** V. Almborg. *Gjuteriet*, v. 45, no. 12, Dec. 1955, p. 173-176.

Design considerations for cupola and electric induction melting departments. Diagrams, photographs. (E10, A5)

122-E. Risering of Gray Iron Castings. E. J. Sullivan, Jr., C. M. Adams and H. F. Taylor. *American Foundrymen's Society, Transactions*, v. 63, 1955, p. 8-12.

Effects of carbon, silicon and other elements on shrinkage behavior, relationship between shrinkage, graphite structure and mold dilation. Tables, diagram, graphs, micrographs. 2 ref. (E22, Fe)

123-E. Range of Effectiveness of Chills. Victor Paschkis. *American Foundrymen's Society, Transactions*, v. 63, 1955, p. 13-16.

Decreasing influence of a chill on the surface of a large cast slab. Graphs, diagram. (E25, ST)

124-E. Principles Applicable to Vertical Gating. K. R. Grube and J. G. Kura. *American Foundrymen's Society, Transactions*, v. 63, 1955, p. 35-48.

Improved gating system applicable to permanent, shell or sand molds of appreciable height. Tables, photographs, diagram, graphs. 18 ref. (E22, Al)

125-E. Current Status of Test Patterns for Evaluation of Sand Mixtures. Charles Locke. *American Foundrymen's Society, Transactions*, v. 63, 1955, p. 49-62; disc., p. 62.

Review of literature concerning design and function of test patterns that have been and are being used. Diagrams, photographs, graph, tables. 46 ref. (E18)

126-E. Development in the Light Castings Industry Including the New Die Pressing Process. R. S. M. Jeffrey. *American Foundrymen's Society, Transactions*, v. 63, 1955, p. 63-70.

Pedestal grinder, collection of cupola dust, anomalies in fluidity, enamel blistering, mechanization and the die pressing process. Diagrams, tables, photographs, micrographs. 10 ref. (E general, E13)

127-E. Monolithic Converter Linings. J. Davies. *American Foundrymen's Society, Transactions*, v. 63, 1955, p. 71-75.

Converter lining life has been extended by using rammed quartz (bonded with bentonite) graded to a maximum packing density. Methods for adjusting the grading, ramming, drying and patching. Diagrams, photographs, graphs, tables. 3 ref. (E10, D3)

128-E. A Critical Analysis of the Cylindrical Standard Test Specimen

for Foundry Sands. Walter Goetz. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 76-95; disc., p. 96-98.

Alterations of strength and permeability caused by varying the moisture content of the test specimen are valid in the foundry mold if a sand is tested according to the AFS method. Graphs, photographs, tables. 28 ref. (E18)

129-E. The Influence of Molding Materials on the Incidence of Hot Tearing. J. M. Middleton. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 99-108.

Incidence of hot tearing was greater in test molds bonded with organic materials than in those bonded with clay. Photographs, graphs, diagrams, tables. 4 ref. (E18, ST)

130-E. Dissolved Gas in Liquid Cast Iron. Wm. Y. Buchanan. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 109-114; disc., p. 114-115.

Method of collecting gas for analysis and for measuring rate of evolution. Diagrams, graph, photograph, tables. (E25, CI)

131-E. The Scabbing Defect. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 123-142.

Report of test data evaluating the effects of sands (No. 35 through 52) on scabbing tendencies. Photographs, tables, graphs, diagram. 2 ref. (E18)

132-E. Dimensional Tolerances and Surface Structure in Various Shell Cast Metals. Richard A. Flinn, Walter B. Pierce, Floyd R. Smith and Paul F. Youngdahl. *American Foundrymen's Society,* v. 63, 1955, p. 143-156.

Investigation and evaluation of the surface quality, dimensional variation and surface microstructure obtainable in shell molded castings. Photographs, micrographs, graphs, tables, diagram. 1 ref. (E16, M27)

133-E. Forehearth Refractories for Soda Ash Desulphurizing. Sam F. Carter and Ralph Carlson. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 170-176; disc., p. 176.

Tests types of materials and properties that affect soda resistance. Tables, diagrams, photographs. (E10)

134-E. Pressure Molding Influences on Pattern and Rigging. T. E. Barlow and W. J. Burk. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 191-194.

Requirements for patterns, flasks and rigging are normal. (E17, E22)

135-E. Application of Refractories in the Foundry. F. H. Fanning. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 195-198; disc., p. 198.

Compares power press, extrusion and air-rammed high-duty and super-duty fireclay and high-alumina brick refractories. Tables. (E10)

136-E. An Investigation of Precision Casting of Experimental Propellers. A. R. Willner, S. Goodman and C. L. Tippett. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 199-202.

Model aluminum propellers were precision cast to specifications. Describes a dispensable wax pattern, dewaxing under steam pressure, low-temperature investment mold drying and a casting technique utilizing a partial vacuum and inert gases. Photographs, diagram. 1 ref. (E15, T24, Al)

137-E. Vapor Holes From Loose Sand Grains in Brass and Bronze Castings. Floyd Keller and W. B. George. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 217-219; disc., p. 219-222.

Vapor holes appearing in brass and bronze castings as a result of sand grains entrapped during solidification. Photographs, micrographs. (E23, E25, Cu)

138-E. The Meaning of the Cast Test Bar in the Evaluation of Aluminum and Magnesium Alloy Castings. A. G. Slachta and H. Mansfield. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 223-232; disc., p. 232.

Evaluations of test bar relationships to the castings they represent were made using an Al-Cu-Si alloy (AMS 4214 or SC51A-T71) and a rare earth magnesium alloy (WAD 6495 or EZ 33A-T5). Graphs, micrographs, tables, photographs. 3 ref. (E25, Al, Mg)

139-E. Microporosity in Gun Metal Pressure Castings. A. H. Hesse, M. Glassenberg, and W. H. Baer. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 233-242; disc., p. 242-243.

Melt quality, gates, risers and pouring temperature can be varied to minimize microporosity in definite regions. Diagrams, photographs, tables. (E25, Cu)

140-E. A Simplified Method for Determining Riser Dimensions. H. F. Bishop, E. T. Myskowski and W. S. Pellini. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 271-281.

Caine's risering method may be replaced with shape factors expressed in terms of length, width and thickness of the casting. Minimum riser dimensions can be determined for complex shapes featuring appendages and for shapes involving retarded cooling rates. Diagrams, tables, photographs, graphs. 6 ref. (E22, ST)

141-E. What Design Engineers Look for in Castings. Trevor Davidson. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 282-286.

Includes diagrams, photographs. (E general)

142-E. Risering of Commercial Steel Castings. Charles W. Briggs. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 287-290.

Method for computing riser dimensions for castings. Diagrams, graphs. (E22, CI)

143-E. Application of Indirect Chills. Charles Locke. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 291-292.

Use of indirect chilling for two production castings. Photographs. 5 ref. (E25)

144-E. Risering Requirements of Nodular Iron. R. C. Shnay. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 293-294.

Includes radiographs, table. (E22, CI)

145-E. Application of Chills for Neutralization of Rib and Boss Hot Spots on Plates. E. T. Myskowski and H. F. Bishop. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 295-300.

Chart method developed for determining chill thickness necessary to neutralize appendages which develop hot spot conditions. Radiographs, diagrams, tables. 4 ref. (E25, CI)

146-E. Measurement of Gas in Molten Aluminum. H. Rosenthal and S. Lipson. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 301-305.

Under standard test conditions, a correlation can be established between the densities of atmospherically solidified and reduced-pressure solidified aluminum alloys removed from the same heat at the same time. Gas volume lost during reduced-pressure solidification is related to the gas content of the initial melt. Photographs, graphs, diagram. 9 ref. (E25, Al)

147-E. Casting Finish as Affected by Sand Additives. Burdette Jones. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 307-312.

Includes photographs. (E18)

148-E. Metallurgical Requirements and Production Techniques for Titanium Castings. D. I. Sinizer and C. M. Adams, Jr. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 313-316.

Handling of liquid titanium, refining and remelting, skull melting, gating, furnaces and molds. Graph, photographs, diagram. (E general, Ti)

149-E. Sealing Metal Coreboxes Against Blow-By. Richard L. Olson. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 325-326.

Dike-type seal which maintains consistent core permeability and eliminates blow-by. Photographs. (E21)

150-E. Application of Insufficient Chills. E. C. Troy. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 327-329.

Insufficient chills used to promote solidification control, by gradient heat extraction, were found to be practical. Graph, diagrams, photographs, radiographs. (E25, CI)

151-E. Metallurgical Controls for Duplexed Malleable Iron. Lawrence E. Emery. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 330-335.

Includes photograph, tables, graphs, micrographs. (E25, CI)

152-E. Development of a Bottom Pour Ladle Practice. A. W. Fastabend. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 336-338; disc., p. 339.

Refractory linings for ladles. Photograph, table, graph. (E23)

153-E. Ladle Practice. Arthur P. Guidi. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 340-344; disc., p. 344.

Ladle practice, without regard to theory, at an electric steel casting company. Photographs, graph. (E23, CI)

154-E. Improvement of Pressure Tightness and Tensile Properties of Gun Metal Bronze by Vacuum Degassing. W. H. Johnson, H. F. Bishop and W. S. Pellini. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 345-352; disc., p. 353-354.

Equipment and operational variables for degassing gun metal bronze melts in a vacuum chamber. Graphs, diagrams, tables, micrographs, photograph. (E10, Cu)

155-E. Shell Molding Process and Equipment. J. Sutherland and C. O. Schopp. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 355-362.

Advancements in shell molding by equipment manufacturers and foundry operators. Photographs, diagrams. (E16)

156-E. Pressure Pouring and Graphite Permanent Molds Used in Production of Steel Car Wheels. H. H. Hursen. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 367-372.

Molten steel is forced through a refractory tube from the ladle to the graphite permanent mold by compressed air. Photographs, diagram. (E12, T23, ST)

157-E. Coreroom Practice Pitfalls. R. H. Greenlee. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 373-376.

Core requirements, core sand additives, coreroom supervision, raw materials, core scrap. Photographs. (E21)

158-E. Gypsum Cement Molds for Plastic Patterns. M. K. Young. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 377-382.

Production methods for rapid, accurate, nexpensive gypsum cement moldmaking. Photographs. (E17, E19)

159-E. Engineering Methods in Practical Sand Problems: Strength—Density Relationships. V. E. Zang and G. J. Grott. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 383-388.

Basic stress calculations may be applied to molding sand mixtures. Bond strength and the coefficient of intergranular friction may be evaluated at any given density of the sand mixture. The bond strength to friction ratio reflects the sand mixture "moldability". Graphs, diagrams. 5 ref. (E18, E19)

160-E. Feeding Range in Shell Molds. R. E. Morey, H. F. Bishop and W. S. Pellini. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 419-424; disc., p. 424.

Riser feeding range can be determined by radiography for alloys that develop centerline shrinkage. Feeding range values for aluminum and bronze alloys (containing dispersed porosity) can be determined by hydraulic pressure tests. Data obtained for conventional sand mold castings can be applied to shell mold castings. Radiographs, graphs, table, photograph. 14 ref. (E23, E16)

161-E. General Motors Experimental Foundry. Louis J. Pedicini. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 434-441.

Special features of the foundry. Photographs, diagram. (E general, A5)

162-E. Make Plaster Cores in Rubber-Lined Boxes. Robert F. Dalton. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 442-445.

Advantages and disadvantages of rubber-lined core boxes for plaster molding, with a description of the core-box lining process. Photographs. 2 ref. (E21)

163-E. A New Foundry Core Sand Binder. Charles J. Gogek. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 472-475.

Test results and discussion of a new white, water-soluble binder containing over 90% corn sugar. Tables, photographs, graphs. (E18)

164-E. Precision Patterns From Zircon Molds. J. E. Stock and A. V. Schoville. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 476-479.

Includes photographs. (E17, CI)

165-E. Reactions During Core Baking. Gerald J. Grott and Howard F. Taylor. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 493-502.

Critical survey of work done in the field. Tables, graphs, photographs. 21 ref. (E21)

166-E. Fluidization-Injection Process for Desulphurizing and Upgrading Cast Iron. G. P. Dahm, H. C. Barnes and C. E. Bieniosek. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 511-520; disc., p. 520-523.

Effects of nitrogen injection of calcium carbide on sulfur content, chill, fluidity, machinability and other physical properties of cast iron. Effects of gaseous injection of upgrading agents. Photographs, graphs, micrographs, tables. (E25, CI)

167-E. Calcium Carbide Desulfurization by the Injection Process. John A. DeHuff and R. Schneidewind. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 524-530; disc., p. 530-532.

Calcium carbide desulfurization is a rapid and clean method. The efficiency of the reaction is better at the higher melt-in sulfur values. The reaction will occur at temperatures as low at 2300 to 2400° F. Micrographs, graphs, photographs, tables. 8 ref. (E10, CI)

168-E. Increasing Carbon Content of Cast Iron By Ladle Injection. G. E. Spangler and R. Schneidewind. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 533-539; disc., p. 539-540.

Increases up to 1.0% carbon have

been made in 3 min. or less by injection process. Recovery efficiencies range from 50 to 100%. Tables, micrographs, graphs. 7 ref. (E23, CI)

169-E. New High Strength Cast Irons Produced by Injection Methods. J. W. Estes and R. Schneidewind. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 541-552; disc., p. 552.

Injection of calcium carbide and rare earth oxides, and/or magnesium oxide can produce upgraded cast irons with as-cast tensile strengths at or above 50,000 psi. The upgraded irons have properties of low hardness, ductility, low chill depth, intensitivity to cooling rate in various sections and low solidification shrinkage. Graphs, tables, micrographs. 7 ref. (E25, Q general, CI)

170-E. Application of Insulated Risers to Production of Aluminum Alloy Sand Castings. W. A. Mader. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 553-550; disc., p. 560-561.

Riser insulation causes reduction of heat losses by conduction and radiation. Advantages and disadvantages of permeable gypsum plaster, expanded perlite and exothermic riser sleeves. Table, photographs, graph. 10 ref. (E22, Al)

171-E. Production of Aluminum Alloy Specification Castings. Roy E. Paine and P. V. Faragher. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 562-568.

Purposes of specifications and the establishment of foundry methods. Effects of remelting, molding and heat treating practices on casting quality. Photographs, table. 2 ref. (E general, S22, Al)

172-E. Clay, Fines, and Water Relationships for Green Strength in Molding Sands. A. H. Zrimsek and R. W. Heine. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 575-581.

Green strength of sand-clay mixtures is sensitive to a clay content of less than 10 to 20%. When present, silica flour fines tie up about 1 to 1.5% bentonite per 1% silica flour and prevent the peak strength (for a given percentage of bentonite) from being obtained. Tables, graphs. 1 ref. (E18)

173-E. Wood Pattern Construction Standards and Specifications. John F. Roth. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 587-588.

Proposed standards and specifications for wood pattern construction. Discusses woods, joints, glues and pattern sizes. (E17)

174-E. Improving Refractory Cost in Malleable Melting. L. E. Emery. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 589-595; disc., p. 595.

Economic importance of refractories used in sidewalls, tap-out blocks, furnace bottoms, ladles, bungs. Tables, diagrams, photographs. (E10, CI)

175-E. A Quantitative Evaluation and Importance of Hydrogen in Aluminum Founding. Dixon Chandley, Clyde M. Adams, Jr., and Howard F. Taylor. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 607-614.

Effect of hydrogen content on tensile properties of 195 alloy; sources of hydrogen; techniques for degassing aluminum. Graphs, tables, photographs. 3 ref. (E general, Q23, Al)

176-E. Risering of Nodular Iron. II. Effect of Silicon Content on Feeding Distance. R. C. Shnay and S. L. Gertsman. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 632-636; disc., p. 636-637.

Sampling for carbon in nodular iron. Variations in silicon content from 2.57 to 3.13% have no appreciable effect on the feeding distance of hypereutectic nodular irons. Hypoeutectic nodular iron plates, ½ to 1½ in. thick, have a shorter feeding distance than hypereutectic plates. Graphs, diagrams, tables. 10 ref. (E22, CI)

177-E. Load Carrying Power of Molding Sands. H. W. Dietert, F. S. Brewster and A. L. Graham. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 642-647; disc., p. 647-649.

Correlates soundness of castings to the load-carrying power of a sand. A sand with a better load-carrying power produces a casting with less tendency toward shrinkage. Graphs, photographs. (E18)

178-E. A Malleable Furnace Refractory Cost Reduction Program. F. J. Pfarr and A. S. Johnson. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 657-661; disc., p. 661.

New method of sidewall construction which is labor saving and prolongs refractory life. Diagrams, photographs. (E10, CI)

179-E. Influence of Vibration on Fluidity and Filling During Investment Casting of an Aluminum Alloy.

D. W. Levinson, A. H. Murphy and W. Rostoker. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 683-685; disc., p. 686.

Molten metal was found to enter and to flow through small channels more easily when aided by vibration. Vibration intensity governs the degree of flow. Graph, diagram, photographs, tables. 3 ref. (E23, E15, A1)

180-E. Surface and Internal Bubble Control in Poured Investment Plasters. J. N. Trant and R. G. Megaw. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 689-692.

Pattern surfaces should be covered with a parting compound to insure rupturing of surface bubbles. By blending a separately generated foam with the plaster slurry, resulting internal bubbles will be small, uniform and interconnected. Tables, photographs. 4 ref. (E16)

181-E. Manufacture of High-Quality, Pressure-Tight Steel Castings. John F. Wallace. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 693-702.

Hardening, heat treatment, chemical composition, molding, melting, gating, risering, rough machining and inspection required in the production of pressure-tight steel castings. Graphs, photographs, diagrams. 24 ref. (E11, CI)

182-E. A Case Study of a Premium Strength Casting of 220-T4 Aluminum Alloy. A. J. Carah. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 703-709.

Research, development and production report on a rocket missile fin base cast from a light alloy. Photographs, diagrams, graphs. (E11, T24, A1)

183-E. Microscopy and Molding Sands. V. D. Frechette. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 710-716.

Use of polarizing and stereoscope microscopes to investigate textural characteristics of foundry sands. Graphs, tables, photograph, diagrams. 25 ref. (E18, M21)

184-E. Research in the Patternmaking Industry. David T. Kindt. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 717-719.

Drying and dry film characteristics of pattern coating. Tables. (E17)

185-E. Risering of Ductile Cast Iron. Riser Dimensions, Feeding Distance, and Other Data. R. A. Flinn, D. J. Reese and W. A. Spindler. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 720-724; disc., p. 724-725.

Includes graphs, radiographs, photographs, tables. 2 ref. (E22, CI)

186-E. A Study of Cupola Design and Operating Factors That Influence the Emission Rates From Foundry Cupolas. R. C. Ortgies. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 741-744.

Determination of the exact amount of material discharged from a cupola stack. Discusses factors (bed height, charging doors, stock height, igniters, blower air volume, material handling) which affect dust emission. Diagrams, photographs, tables. (E10, A8)

187-E. Investment Casting by the Frozen-Mercury Process. Irvin R. Kramer and Leonard J. Goldwater. *Archives of Industrial Health,* v. 13, Jan. 1956, p. 29-33.

Frozen mercury is good pattern material because of its self-welding property and its low volumetric change on melting. Adequate health protection of workers is necessary. Photographs. (E15, A7)

188-E. Conversion of Cupolas From Cold to Hot Blast, and Operating Economies. R. Burleigh. *Foundry Trade Journal,* v. 100, Jan. 5, 1956, p. 5-10.

Emphasizes the considerable reduction in fuel consumption which can be affected with the use of hot blast. The direct economics are given, with a description of conversion to hot blast in one particular foundry. Diagrams, photographs, tables. (E10, CI)

189-E. A Yorkshire Die-Casting Foundry. *Foundry Trade Journal,* v. 100, Jan. 5, 1956, p. 21-22.

Special castings described, with emphasis on die design and planning. Photograph. (E13)

190-E. Progressive Mechanization as Applied to Core Making in a Production Foundry. Clifford W. Hockman. *General Motors Engineering Journal,* v. 3, Jan.-Feb. 1956, p. 2-9.

Development and operation of an automatic core blower, for use in foundry of automotive industry, which increases quality and production while saving maintenance and space. Photographs. (E21, CI)

191-E. Bore Cracks. D. E. Brooks. *Iron & Steel,* v. 29, Jan. 1956, p. 15-16.

Summary of study done by U. S. Naval Research Laboratory on defects in cast steel fittings and valve bodies. Factors considered were stresses, design of valve or fitting, gating, chills, hollow cores

used in molds, liquid shrinkage, pouring temperature, veins. Diagrams. (E general, Q26, ST)

192-E. Close Limit Diecastings. H. K. Barton. *Metal Industry,* v. 88, Jan. 20, 1956, p. 43-46.

Factors affecting dimensional accuracy, methods of controlling variations. Diagrams. (E13)

193-E. Foundry Headaches Are Being Cured by CO_2. *Metalworking Production,* v. 100, Jan. 20, 1956, p. 93-97.

Method of coremaking in which binder, based on sodium silicate, is added to dry silica sand and the cores are then gassed by passing CO_2 through them. Chemical reaction between binder and CO_2 produces hard bond, hardening the core in a few seconds. No baking or drying is required. Diagrams, photograph. (E19, E21)

194-E. Die-Cast Aluminum Engine Block. *Western Machinery and Steel World,* v. 47, Jan. 1956, p. 89.

Production of world's first aluminum die-cast six-cylinder automobile engine block shows an approximate 10% price advantage over gray iron block which requires fewer secondary operations, since machining is confined to main sealing areas. Superior heat conductivity of aluminum also permits use of less complicated cooling system. Photographs. (E13, T25, Al)

195-E. (French.) **Considerations on the Cold Blast Cupola.** Francois Danis. *Fonderie,* 1955, no. 119, Dec., p. 4821-4836.

Processes taking place in a cold blast cupola and dimensional characteristics. Graphs, diagrams. 15 ref. (E10, CI)

196-E. (French.) **Molding Sand for Thin Pieces.** *Fonderie,* 1955, no. 119, Dec., p. 4837-4840.

Role of fineness of grains in the characteristics of molding sands; plasticity measurements; selection and preparation of sand; use of mineral black. Diagrams. (E18)

197-E. (German.) **Efficient Grain-Refining Method for Hypereutectic "GAlSi" Alloys.** Wolfgang Thury and Hermann Kessler. *Zeitschrift für Mettallkunde,* v. 46, no. 12, Dec. 1955, p. 846-849.

Grain refinement of primary silicon crystals in a hypereutectic aluminum-silicon piston alloy by a new aluminum phosphide and chlorine gas treatment. Maintenance of ideal crystal distribution by repeated gas treatments. Micrographs. 5 ref. (E25, Al, Si)

198-E. (Book.) **American Foundrymen's Society, Transactions** (Annual Volume), v. 63, 1955, 761 p. American Foundrymen's Society, Golf and Wolf Roads, Des Plaines, Ill.

Papers cover melting, pouring, molding, testing, and other aspects of foundry practice. Papers are individually abstracted. (E general)

199-E. Glass Cast Molds for Precision Casting of High Temperature Alloys. *Industrial Heating,* v. 23, Jan. 1956, p. 140 + 5 pages.

Procedures and equipment necessary for Glascast process. Method is quick and economical, meeting high precision standards. Photographs. (E16)

200-E. Shell Molding Advances Foundry Automation. James Sutherland. *Tool Engineer,* v. 36, Feb. 1956, p. 209-210.

Outline of the automatic shell molding process and its advantages. Photographs, diagram. (E16, A5)

201-E. Zircon Sands Give Smoother Steel Casting Surface. Hubert Chappie. *Western Metals,* v. 14, Jan. 1956, p. 68, 71.

Advantages are high conductivity, high melting point of 4000 or 3400° F., with binders, low expansion, excellent chilling properties, chemical stability, ease of removal from castings during shakeout and fineness. Cost is minimized and best results obtained by using it sparingly. Photographs. (E18, CI)

202-E. Magnesium Plaster Castings. E. J. Willis. Paper from "The User Speaks About Magnesium". Magnesium Association, 6 p.

Plaster molds are being used where normal sand castings were inadequate or impossible. Some points on the use of plaster are clarified, which lead to a better understanding of the problems in the production of castings and the usefulness of the plaster process to the ultimate user. Photographs, diagrams. (E16, Mg)

203-E. More Bark Than Bite. Sherwood H. Egbert. Paper from "The User Speaks About Magnesium". Magnesium Association, 17 p. + 7 plates.

Problems and their solution involved in the production of magnesium die castings and their subsequent processing into finished parts. Photographs. (E13, Mg)

204-E. (Czech.) **Melting and the Effect of Melting and Casting Conditions on the Mechanical Values of Tin Bronzes.** Josef Krumpos. *Slévarenstvi,* v. 3, no. 12, Dec. 1955, p. 373-380.

Melting and deoxidation of tin bronze and red brass, casting of test specimens, mechanical proper-

ties. Tables, graphs, diagrams, micrographs. 7 ref. (E25, Q general, Cu)

205-E. (Czech.) **Testing of Molding Materials. II. Wear Testing of Cores. Auxiliary Equipment.** Ladislav Jenicek. *Slévarenstvi,* v. 3, no. 12, Dec. 1955, p. 380-385.

Wear test is described and no relation between wear and bending resistance was evidenced. Other variables are evaluated. (E21)

206-E. (Czech.) **Possibilities of Pouring in Permanent Molds in Gray and Malleable Cast Iron Foundries.** Fritz Naumann. *Slévarenstvi,* v. 3, no. 12, Dec. 1955, p. 385-387.

Materials and design considerations. Procedures for production of gray iron castings by pouring into open permanent and semipermanent molds and closed permanent molds. (E12, CI)

207-E. (Czech.) **Measure of Blast Volume in the Cupola.** Zdenek Gause. *Slévarenstvi,* v. 3, no. 12, Dec. 1955, p. 388-391.

Equations for measuring blast flow. Data for use of the Prandtl tube. Work is undertaken to reduce waste casting. (E10)

208-E. (Czech.) **New Core Binders Utilizing Synthetic Resins.** Jiri Ornst. *Slévarenstvi,* v. 3, no. 12; *Prace Ceskoslovenského vyzkumu slévarenského,* v. 2, no. 26, Dec. 1955, p. 175-180.

A new binder, VUMT 71, based on a phenol resin, utilizes the emulsion effects of sulfite lye and the chemical reactivity of lignin. One hour bake is usually adequate, but overbaking is tolerated. (E18, E21)

209-E. (German.) **The Basic Hot-Blast Cupola Furnace as a Premelting Unit in the Openhearth Steel Plant.** Wilhelm Schüll and Georg Rockrohr. *Stahl und Eisen,* v. 76, no. 1, Jan. 12, 1956, p. 1-12; disc., p. 12-13.

Description of plant, method of operation, problems of materials to be charged, composition and preliminary treatment of premelted iron, production and economic factors. Photographs, diagrams, graphs, tables. 15 ref. (E10, D2, ST)

210-E. **Design Considerations for Magnesium Plaster-Mold Castings.** E. J. Willis. *Machine Design,* v. 28, Feb. 9, 1956, p. 131-132.

Improved design can mean better tolerances and smoother surface conditions, along with cost reduction, by elimination of machining in finishing. Photographs, diagrams. (E16, Mg)

211-E. **Sand Mould Penetration Testing. I. A Simple Laboratory Apparatus for Estimating the Resistance of Sand Moulds to Penetration by Molten Metal.** D. H. Houseman, D. V. Atterton and T. P. Hoar. *Metallurgia,* v. 53, no. 315, Jan. 1956, p. 21-25.

Apparatus whereby a sample may be removed from the face of a sand mold or standard compact and tested for its resistance to penetration by mercury at room temperature. Diagram, photograph, graphs, tables. 3 ref. (E18, E19)

212-E. **Vibration During Casting of Gas Turbine Blades.** (Digest of "The Application of Sub-Sonic Vibrations During Solidification of Castings, With Particular Reference to a Material for Gas Turbine Blades—'H. R. Crown Max'", by S. Hinchliff and Josiah W. Jones, College of Aeronautics, Report No. 89, Apr. 1955, 42 p.) *Metal Progress,* v. 69, Feb. 1956, p. 134, 136, 138.

Significant improvements in mechanical properties obtained by vibration during solidification of a 23% chromium, 12% nickel, 3% tungsten alloy. Table. (E11, SS)

213-E. **Stainless Steel—Investment Cast.** E. L. White, Jr. *Precision Metal Molding,* v. 14, Feb. 1956, p. 42-43, 82.

Tables of chemical composition and mechanical characteristics of several investment cast stainless steels of the austenitic and martensitic types. Tables, photograph. (E15, Q general, SS)

214-E. **Insulated Risers for Permanent Mold Casting.** D. Peckner. *Precision Metal Molding,* v. 14, Feb. 1956, p. 57-58, 95-96.

Insulated riser sleeves are used to slow down rate of heat transfer between cast alloy and metal molds. Photographs. (E22, E12)

215-E. (French.) **The Behavior of Refractory Alloy Cast Pieces for Jet Engines. (oLst Wax Process).** W. Sulzer and F. Eisermann. *Métaux, corrosion-industries,* v. 30, no. 363, Nov. 1955, p. 440-446.

Thermal shock tests with refractory materials, cast by the lost wax process, show that blades cast for jet engines behave as well as forged pieces. Tests and results with several alloys at different temperatures examined. Diagrams, tables, photographs. (E15, Q general, T24, EG-d)

216-E. (Italian.) **Principal Addition Elements in Cast Iron and Steel.** *Fonderia,* v. 250, no. 12, Dec. 1955, p. 573-576.

Principal and secondary constituents of cast iron and steel, their influence and use. Use of aluminum,

arsenic, nitrogen and beryllium as corrective elements for improving quality of cast iron and steel. (To be continued.) (E25, B22, CI)

217-E. (Russian.) **Experience in the Use of the Chemical Method for Hardening Foundry Cores.** I. B. Semenchenko. *Liteinoe proizvodstvo,* no. 12, Dec. 1955, p. 1-12.

Composition of mixture and type of sand, special design of core boxes to control carbon dioxide and liquid glass. This method is especially suitable for casting alloy steel parts in small-scale practice. Table, photographs. (E21, CI)

218-E. (Russian.) **High-Strength Pattern Compositions for Precision Casting.** P. V. Sorokin and E. K. Alekseevskaia. *Liteinoe proizvodstvo,* no. 12 Dec. 1955, p. 2-4.

Polyethylene and its properties. Use and evaluation of paraffin or ceresin wax and their blends or fusions with polyethylene. Graphs, tables. 6 ref. (E15, E17)

219-E. (Russian.) **Improving the Design and Construction of Compression Molds for Pressure Die Casting.** V. I. Vagin. *Liteinoe proizvodstvo,* no. 12, Dec. 1955, p. 13-15.

Automatic arrangements for removing various mold and core sections. Diagrams. (E13)

220-E. (Russian.) **Importance of Forehearth in Cupola Melting.** V. A. Fuklev. *Liteinoe proizvodstvo,* no. 12, Dec. 1955, p. 17-18.

Proper use of this reservoir in maintaining surge capacity. Charge make-up and charging practice. Melting phenomena. Diagrams. (E10, CI)

221-E. (Russian.) **Effect of Nonmetallic Inclusions on Formation of Gaseous Porosity.** D. P. Lovtsov. *Liteinoe proizvodstvo,* no. 12, Dec. 1955, p. 18-20.

Such inclusions increase viscosity of melt, change surface tension and character of crystallization of metals, seriously lower mechanical properties, act as centers of gas-bubble formation and have a decisive effect on absorption of gases by metals. Photographs, table. 8 ref. (E25, Al)

222-E. (Russian.) **Gas Content of Magnesium Cast Iron.** V. I. Lakomskii and V. I. Iavoiskii. *Liteinoe proizvodstvo,* no. 12, Dec. 1955, p. 20-22.

Composition and amount of gas in various types of cast iron. Methods of controlling gas-formation so as to improve structure and properties of cast iron. Modification process in cast iron. Tables, graphs, photograph. 16 ref. (E25, CI, Mg)

223-E. (Russian.) **Use of Easily Removable Foundry Heads on a Massive Steel Casting.** I. E. Blokhin, E. T. Dolbenki, V. I. Emel'ianov and V. A. Pershin. *Liteinoe proizvodstvo,* no. 12, Dec. 1955, p. 24-25.

Advantages of this design and method over set-up with foundry head removed by machine or flame-cutting. Use of separating plates with feeder openings and frame rods. Diagrams, graph, table. (E22, CI)

224-E. Pressure Die Casting of Shock Absorber Components. *Machinery (London),* v. 88, Feb. 3, 1956, p. 217-225.

Control equipment, die casting machines and their adaptations, castings and dies, casting with tubular insert, fettling methods. Photographs, diagrams. (E13)

225-E. Foundry Techniques. Gating for Shell Moulding Castings. M. R. Hinchcliffe. *Metal Industry,* v. 88, Jan. 27, 1956, p. 63-65.

Treatment of some of the difficulties encountered in foundry practice. Characteristics of the shell mold, layout of runners and gates, special problem of feeding heads. Diagrams. (E22, E16)

226-E. How to Make Good Test Bars. Frank J. Daniels. *Modern Castings,* v. 29, Feb. 1956, p. 29-30.

Selecting the proper test casting, standardizing melting and pouring procedures, recommended procedures. Diagrams, photograph. (E general)

227-E. Pneumatic Reclaimer Lengthens Life of Sand. Alexander D. Barczak. *Modern Castings,* v. 29, Feb. 1956, p. 24-27.

Reclaim system includes equipment for screening and feeding used sand, pneumatic scrubbing unit proper, an air cascade-type classifier, a dust collector, and dump buckets to bring used sand to the installation and transport reclaimed sand. Diagrams, graph, photographs, tables. (E18)

228-E. Five Ways to Use Zircon Sand. Albert L. Kreuer. *Modern Castings,* v. 29, Feb. 1956, p. 31.

Use of zircon with new techniques, methods, equipment and mechanization to equalize rising cost of casting metals. Photograph, table. (E18, Zr)

229-E. It's Easy to Try Basic. J. D. Sheley. *Modern Castings,* v. 29, Feb. 1956, p. 32.

Experimentation with air-placing a basic refractory on the regular

acid lining of production cupolas. Photograph. (E10)

230-E. Investment Casters Bid for New Role. *Steel,* v. 138, Feb. 20, 1956, p. 122, 125.

Investment casting of parts for automobile gas turbines is evaluated. Photographs. (E15)

231-E. (Czech.) **Methods for the Choice of a Suitable Chemical Composition of Gray Iron Castings.** Karel Hanak. *Slévarenstvi,* v. 4, no. 1, Jan. 1956, p. 10-16.

Graphic methods for choice of chemical composition of gray iron castings, worked out in form of nomograms. Tables, graphs, diagrams. 14 ref. (E25, CI-n)

232-E. Quality Control in Non-Ferrous Metal Melting. D. D. Stead and P. G. Dodd. *Australasian Engineer,* 1956, Jan. 1956, p. 45-52.

Basic factors affecting quality of molten nonferrous metals in relation to ultimate requirements of the cast product. Methods and precautions involved in controlling these factors. Photographs, table. 20 ref. (E10, Cu, Al, Mg, Zn)

233-E. Risering of Steel Castings. I. H. F. Bishop and W. H. Johnson. *Foundry,* v. 84, Feb. 1956, p. 70-74.

Application of rules for scientifically risering commercial steel castings. Calculation of riser location and size. Graphs, diagrams, photographs. 7 ref. (To be concluded.) (E22, CI)

234-E. Shell Mold Job Shop Makes Variety of Castings. Robert H. Herrmann. *Foundry,* v. 84, Feb. 1956, p. 78-83.

Canadian shop features specially designed equipment and methods, including a unique sand reclamation unit. Photographs, diagrams. (E16)

235-E. Economics of Brass Foundry Operation. Harry St. John. *Foundry,* v. 84, Feb. 1956, p. 84-86.

Accurate cost information and control determine over-all profit. (E general, Cu)

236-E. Selection and Melting of Die Casting Alloys. M. R. Tenenbaum. *Foundry,* v. 84, Feb. 1956, p. 92-95.

Analyses of common die casting alloys, with emphasis on selection, handling and melting. Includes some rules of thumb, applicable to improvement of operating procedures. Tables, photograph. (E13)

237-E. Centrifugal Casting of Aluminum in Permanent Molds. Russell H. Garner. *Foundry,* v. 84, Feb. 1956, p. 96-97.

Equipment used and methods employed. Diagrams. (E12, E14, Al)

238-E. Cooling of Foundry Sands. G. Martin. *Foundry,* v. 84, Feb. 1956, p. 98-103.

Relationship of sand temperatures to casting defects. Results of tests regarding methods of cooling sand. Graphs, table. 3 ref. (E18)

239-E. High-Pressure Molding. Thomas E. Barlow. *Foundry,* v. 84, Mar. 1956, p. 104-109.

Development, present status, future applications, with special emphasis on requirements of molding sands, moisture control, special requirements for large castings, and molding with carbon-dioxide-cured sands. Photographs, graph. (E19)

240-E. Dry Reclamation of Foundry Sand. Henry W. Zimnawoda. *Foundry,* v. 84, Mar. 1956, p. 114-120.

Analysis of operating principles, equipment layouts and costs involved in reclamation systems. Diagrams, photographs, micrograph. (E18)

241-E. Thermal Studies in Shell Molding. Wylie J. Childs and J. B. Hyman. *Foundry,* v. 84, Mar. 1956, p. 121-127.

Study of temperature of shells during investment, curing and pouring operations, effect on residual strength. Data provides guide for selecting correct thickness and strength of shells for given applications. Graphs, photographs. (E16, Al, Cu, ST)

242-E. Dos and Don'ts in Hardening Sand With CO_2. John E. Gotheridge and Frank Pursall. *Foundry,* v. 84, Mar. 1956, p. 128-135.

Detailed discussion of the process, properties required of sands, surface finish and collapsibility, and applications. Diagrams, graphs, photographs. (E18)

243-E. Risering of Steel Castings. H. F. Bishop and W. H. Johnson. *Foundry,* v. 84, Mar. 1956, p. 136-141.

Calculations of riser dimensions for bearing housing castings and ring gear castings; adjusting riser dimensions. Diagrams, photographs, graphs. (E22, CI)

244-E. Here's How to Cast Steel Threads in Gray Iron. *Foundry,* v. 84, Mar. 1956, p. 164-166.

New method cuts material handling costs and eliminates expensive drilling and tapping. Photographs. (E16, SS, CI)

245-E. Permanent Mold Casting Machine Is Electronically Controlled. Thomas A. Dickinson. *Foundry,* v. 84, Mar. 1956, p. 176, 178-179.

Machine designed to produce nonferrous castings in permanent molds with rapid speed, with finish and dimensional tolerances equivalent to those of pressure die castings, and a dense, homogeneous grain structure. Photographs. (E12)

246-E. Fluidity Testing Developments. V. Kondic. *Foundry Trade Journal,* v. 100, Jan. 12, 1956, p. 31-36.

Different tests of fluidity and their possibilities for application in normal foundry operation. A star-type test piece is recommended. Diagram, graph, table. 3 ref. (E25)

247-E. Shanks and Ladles. *Foundry Trade Journal,* v. 100, Jan. 12, 1956, p. 45-47.

Describes and illustrates construction of one-man pouring ladle for foundry work. Photographs, diagram. (E23)

248-E. Co-Operation Between Engineer and Foundryman on Casting Design. Georges Blanc and Marcel Jaumain. *Foundry Trade Journal,* v. 100, Jan. 19, 1956, p. 63-73.

Efforts of French foundrymen and design engineers to cooperate for efficient casting operation. Gives several "before and after" examples. Photographs, diagrams. 12 ref. (E general)

249-E. Silicon-Carbide Shapes as Denseners in the Foundry. H. W. Griffiths. *Foundry Trade Journal,* v. 100, Jan. 19, 1956, p. 75-77.

Application of silicon-carbide blocks in molds to serve as denseners; advantages over cast iron denseners. Photographs, diagrams. (E25, CI)

250-E. The Shaw Process of Precision Casting. *Machinery,* v. 88, Feb. 1956, p. 268-275.

Developments and applications being made by various companies employing the Shaw process in Europe, U.S.A. and Australia. Photographs. (E13, T general)

251-E. The Design of Diecastings and Diecasting Dies. I. W. M. Halliday. *Machinery Lloyd (Overseas Ed.),* v. 28, Feb. 18, 1956, p. 69-71, 73-75.

Section thickness of walls, bosses, ribs and beads; satisfactory and unsatisfactory designs. Diagrams, table. (E13)

252-E. Casting With Carbon Dioxide Hardened Sands. *Mechanical World and Engineering Record,* v. 136, Feb. 1956, p. 54-56.

Hardening procedures. Gas-hardened sands have as chief advantages permanence, lack of distortion, rapidity of production. Capital equipment required is low. Diagrams, graphs. (E19)

253-E. Semi-Collet Diecasting Dies for Reliability and Precision. H. K. Barton. *Mechanical World and Engineering Record,* v. 136, Feb. 1956, p. 66-69.

Constructional features of die elements that move obliquely forward to clear the casting. Diagrams. (E13)

254-E. Pressure Tightness in Gunmetal Castings. M. R. Hinchcliffe. *Metal Industry,* v. 88, Feb. 3, 1956, p. 92-94.

Factors affecting porosity and pressure soundness. Some methods to reduce pressure-test failures. Diagrams. (E11, Cu)

255-E. Pressure Tightness in Gunmetal Castings. II. M. R. Hinchcliffe. *Metal Industry,* v. 88, Feb. 10, 1956, p. 109-111.

Applications and methods of modification to gating systems which have been used where porosity was a source of trouble. Micrographs, diagrams. (To be continued.) (E25, E22, Cu)

256-E. Inclusions and Porosity in Leaded Bronzes. M. R. Hinchcliffe. *Metal Industry,* v. 88, Feb. 17, 1956, p. 129-132.

Practical experiences in founding of various shapes in gunmetals, leaded-copper and nickel bronze. Methods used to overcome inclusions and subsurface porosity. Photographs, diagrams. 2 ref. (To be continued.) (E25, Cu)

257-E. Foundry Techniques. Pressure Tightness in Gunmetal Castings. M. R. Hinchcliffe. *Metal Industry,* v. 88, Feb. 24, 1956, p. 147-149.

Examples where improvements in gating and running systems aided in overcoming porosity and inclusions in gunmetal castings of various shapes and sizes. Photographs, diagrams. 4 ref. (E22, E25, Cu)

258-E. Will the CO_2 Process Mark a New Epoch in Foundry Practice? Peter Trippe. *Metalworking Production,* v. 100, Jan. 27, 1956, p. 139-144.

Reviews experience with the carbon dioxide foundry process in Britain. Photographs. (E18, E19, E21)

259-E. CO_2 Foundry Process Revolutionizes Production for Aluminium Diecasters. Peter Trippe. *Metalworking Production,* v. 100, (Combined Issue), Feb. 10 and 17, 1956, p. 223-227.

Equipment and process used in production of gear boxes, gear carriers and manifolds for the motor industry. Photographs. (E13, T21, Al)

260-E. "It Couldn't Be Done!" But Small Brass Shop Mechanized Anyway. Vern Carlson. *Modern Castings,* v. 29, Mar. 1956, p. 26-29.

Systematic modernization increased casting quality, cut scrap, improved working conditions for six molders. Photographs, diagram. (E11, Cu)

261-E. Cupola Charging Speeded to Break Production Barrier. H. G. McCallum. *Modern Castings,* v. 29, Mar. 1956, p. 30-33.

Electromagnetic metal charge make-up, revamped coke and limestone handling, skip charging now supply the cupolas with charges fast enough to maintain the desired melting rate. Photographs, diagrams. (E10)

262-E. More Revealing Green Core Test. E. C. Zuppann and H. Putz. *Modern Castings,* v. 29, Mar. 1956, p. 34-36.

Authors refined and adapted the green core impact test to give accurate, reproducible results with a minimum of effort, care, and time. Photographs, diagram. (E21)

263-E. Progress in Taming the Sprue. Goro Ohira. *Modern Castings,* v. 29, Mar. 1956, p. 54-57.

How mold filling time is affected by sprue shape, aspiration, gate size and location. Graphs, diagrams, tables. 5 ref. (E22, Al)

264-E. Automatic Batching Prepares Sand for Molds. *Automation,* v. 3, Apr. 1956, p. 73-74.

Combines typical foundry equipment, weight sensitive load cells, a timer and a controller-recorder to speed up operations. Diagram, photograph. (E18)

265-E. Aluminum Die Casting. J. H. Baird. *Canadian Metals,* v. 19, Feb. 1956, p. 36 + 4 pages.

The cold chamber process. Photographs. (E13, Al)

266-E. Frozen Mercury Casting. *Canadian Metals,* v. 19, Feb. 1956, p. 44-45.

Mercasting is an investment casting technique using frozen mercury rather than wax or plastic as a pattern material. Diagrams. (E15)

267-E. A Study in the Design of Sand Molded Engine Castings. Malcolm R. McKellar. *Engineering Journal,* v. 3, Mar.-Apr. 1956, p. 12-18.

Design factors which must be considered to obtain the most economical production of castings. Diagrams, photographs. (E11)

268-E. Gating Affects Quality in Production of Steel Castings. Hubert Chappie. *Foundry,* v. 84, Apr. 1956, p. 90-93.

Use of best possible gating techniques will go far toward producing castings of superior quality. Photographs, diagram. (E22)

269-E. Synthetic Sands for the Nonferrous Foundry. William Ball, III, and George Schultz. *Foundry,* v. 84, Apr. 1956, p. 106-111.

Operation of a synthetic sand system in a nonferrous foundry requires selection and testing of clays, and analyzing the influence of sand and other factors on casting defects. Graph, tables, photographs. 2 ref. (E18)

270-E. (French.) Improvements in the Process of Using Cupolas. M. Jean Guillamon. *Fonderie,* 1956, no. 120, Jan. 1956, p. 21-27; disc., p. 27.

American cupola process for preparation of black-heart malleable cast iron, results of its adoption in France. Diagrams, graphs, tables. 5 ref. (E10, C1)

271-E. (French.) Prerefining in the Ladle, With Pure Oxygen, of Cast Irons Very Rich in Silicon. P. Leroy and D. Menendez. *Institut de Recherches de la Siderurgie, Publications,* ser. A., no. 118, Nov. 1955, 25 p.

Experiments resulted in lowering the silicon, manganese and carbon content of the cast irons, increasing the temperature due to prerefining. Tables, graphs. 4 ref. (E25, CI)

272-E. (French.) The Precision Micro-Foundry and Its Applications in the Aeronautical Industries and in the Special Engines and Rocket Industry. Pierre Lefranc. *Metaux, Corrosion-Industries,* v. 31, no. 365, Jan. 1956, p. 43-47.

Production of small metal and plastic pieces by the lost-wax process. Graph, photographs. (E15)

273-E. (Hungarian.) Special Brass. II. Sandor Polgary. *Öntöde,* v. 7, no. 1, Jan. 1956, p. 9-13.

Melting technology and casting methods. Diagrams. (E10, Cu)

274-E. (Italian.) Chill Castings. R. Allara. *Fonderia,* v. 5, no. 1, Jan. 1956, p. 19-23.

Chill-casting process, equipment, advantages. Photograph, diagrams, table. 1 ref. (E11, E25)

275-E. (Italian.) Prospects for Using Electric Furnaces in the Iron Foundry. *Fonderia,* v. 5, no. 1, Jan. 1956, p. 43, 45, 47.

Possibilities of using nuclear energy to furnish electricity; technological advantages of high-quality products; economic aspects. (E10, ST)

276-E. (Czech.) Examination of Melting Conditions and Testing of Refractory Materials in a Small Cupola With Inside Diameter of 100 Mm. Bretislav Sochor. *Slévarenstvi,* v. 4, no. 2; *Prace Ceskoslovenského Vyzkumu Slévarenského,* v. 3, no. 28, Feb. 1956, p. 197-202.

Details of its use and best charge size. Acid and basic linings evaluated. Tables, diagram, photographs. (E10)

277-E. (German.) Investigation of the Effect of Granulation of Molding Sand on Its Compressibility and Behavior During Use. Franz Hofmann. *Giesserei,* v. 43, no. 5, Mar. 1, 1956, p. 105-108.

Preparation of the test mixture, individual properties related to the granulation, compressibility, permeability, porosity, behavior of quartz sand at high temperature. Table, graphs. 2 ref. (E18)

278-E. (German.) High-Frequency Dryer and Plastic Core in the Foundry. Emil Walther. *Giesserei,* v. 43, no. 5, Mar. 1, 1956, p. 109-112.

Fundamentals of high-frequency drying process and the technical characteristics of the dryer, drying cost, practical experiences. Graphs, photographs. (E21)

279-E. (German.) Effect of New Grain Refining Preparations on Various Properties of GAlSi-Alloys. Hermann Kessler and Hansludwig Winterstein. *Zeitschrift für Metallkunde,* v. 47, no. 2, Feb. 1956, p. 97-101.

By careful selection of the components and by particularly fine grinding of the mixture after the grain refining substance has been added, it is possible to obtain fine-grained, uniformly distributed primary silicon crystals. Table, micrographs. 4 ref. (E25, Al, Si)

280-E. (Polish.) Contraction Ribs Prevent Hot Tears in Steel Castings. Gabriel Kniaginin. *Przeglad Odlewnictwa,* v. 6, no. 2, Feb. 1956, p. 33-39.

Redesigning steel castings to eliminate hot spots that lead to cracking. Optimum angle, size, shape, spacing, thickness of ribs. Relation between dimensions of ribs and those of the walls of the castings. Diagrams, graphs, tables. 8 ref. (E22, E25, CI)

281-E. (Polish.) Casting of Iron Alloys in Permanent Molds. Jozef Kuscewski. *Przeglad Odlewnictwa* v. 6, no. 2, Feb. 1956, p. 39-45.

Preparation and design of cast iron molds. Casting techniques and pouring set-up, including sprue and gate design. Foundry cores. Cast iron versus steel molds; service life in relation to weight of castings. Diagrams, table. (E12, CI, ST)

282-E. (Book.) The Casting of Steel. W. C. Newell, Ed. 599 p. 1955. Pergamon Press, 4 & 5 Fitzroy Square, London W.1. England.

Covers each phase of the design and commercial production of steel castings, beginning with basic principles. (E general, CI)

283-E. Top Loading Sealed Cupola Installation Utilizes Automatic Controls. C. E. Smith. *Automation,* v. 3, May 1956, p. 52-56.

Simplification of the handling of raw products in the preparation of molten iron; elimination of air contamination by waste gases associated with the melting process. Diagrams, photographs. (E10, A5)

284-E. Mechanized Foundry Setup for Shell-Cast Pontiac Crankshafts. Joseph Geschelin. *Automotive Industries,* v. 114, Apr. 15, 1956, p. 48-51.

Some features of product economy achieved by mechanization. Photographs. (E16, A5, CI)

285-E. Zinc Die Castings—Their Design and Application. Ernest Horvick. *Electrical Manufacturing,* v. 57, Apr. 1956, p. 94-101.

Design fundamentals and efficient utilization of die castings. Tables, photographs. (E13, Zn)

286-E. Cure Cores With Co_2—in Seconds. P. M. Unterweiser. *Iron Age,* v. 177, Apr. 12, 1956, p. 95-98.

Hard and sound carbon-dioxide treated cores are cured right in the core box in seconds for improved dimensional accuracy. Diagram, photographs. (E21)

287-E. Copper and Copper Alloys. A Survey of Technical Progress During 1955. E. Voce. *Metallurgia,* v. 53, no. 317, Mar. 1956, p. 103-107.

Reviews production, foundry practice and fabrication developments. 88 ref. (To be continued.)
(E general, F general, G general, Cu)

288-E. Designing for Investment Casting. John E. Srawley. *Product Engineering,* v 27, Apr. 1956, p. 166-169.

Advantages and limitations of the method, tolerances obtainable, types of pattern materials and casting alloys, preparation of alloy specification, inspection procedures. Graph, photographs. 3 ref. (E15)

289-E. Practical Experiences With Carbon Dioxide Process in Coremaking for Tractor Parts. K. Haake and E. Pfitznann. *Henry Brutcher Translation No.* 3641, 4 p. (From *Giesserei-*

technik, v. 1, no. 10. 1955, p. 191-192.) Henry Brutcher, Altadena, Calif.

Most favorable proportion of used sand to be incorporated into cores. Coremaking machines built for foundry. Surface finish of various cores made. Photographs. (E21, T3, CI)

290-E. Tools for Tomorrow's Foundry Progress. *Foundry,* v. 84, May, 1956, p. 106-137.

Developments in mechanization, modernization and automation; future trends in equipment and materials; role of management. (E general, A5, A6)

291-E. How to Use Moldable Exothermic Compounds. *Foundry,* v. 84, May, 1956, p. 150-156.

Application of exothermics and a method for calculating size of feeder heads lined with them. Table, graphs, photographs, diagrams. (E22)

292-E. Is Green-Sand Moulding Deteriorating? Harold Haynes. *Foundry Trade Journal,* v. 100, Apr. 12, 1956, p. 167-172, disc., p. 172-173.

The making of several large castings in green-sand described to show what is possible from the method when intelligently handled. Diagrams, photographs. (E11)

293-E. Cast Manganese Steel. E. Piwowarsky and H. L. Roes. *Foundry Trade Journal,* v. 100, Apr. 12, 1956, p. 177-181.

Indicates temperature at which a casting of given wall thickness should be cast to have a required grain size. Micrographs, photograph, graphs, diagram, tables. (E25, CI)

294-E. A New Combined Degassing-Modification Process. A. Logan. *Light Metals,* v. 19, Apr. 1956, p. 122-125.

Process for simultaneous degassing and modification of aluminum-silicon alloys. Range of aluminum-silicon alloys in use, methods of modification applied. Graphs, photographs, micrographs, tables. (E25, A1)

295-E. Refractory Mould Castings. Arthur Street. *Metal Industry,* v. 88, Apr. 13, 1956, p. 285-289.

Process by which semipermanent ceramic molds are produced. Photographs. (E12)

296-E. New Shell Machine Cuts Resin Costs. R. S. Amala, R. F. Thomson, J. H. Smith and A. L. Boegehold. *Modern Castings,* v. 29, May, 1956, p. 62-65.

Blow-hot press shell molding process makes thinner, stronger shells, makes them faster, and reduces casting warpage. Diagrams, photographs, graphs. (E16)

297-E. Centrifugal Casting of Unusual Shapes in Nonferrous Metals. J. P. Krishon. *Modern Castings,* v. 29, May, 1956, p. 69-71.

A basically simple process with great cost-cutting potential. Photographs. (E14, EG-a)

298-E. Three Ways to Make Epoxy Resin Patterns. E. F. McAfee. *Modern Castings,* v. 29, May, 1956, p. 72-75.

Epoxies are applicable to most methods of pattern manufacture and combinations of materials. Curing equipment is not needed. Photographs. (E17)

299-E. The Foundry of Tomorrow. *Modern Castings,* v. 29, May, 1956, p. 89-112.

Continuous processes, automation, new alloys, metals, and techniques, greater emphasis on precision castings and "as-cast" finishes are predicted. Diagrams. (E general)

300-E. We Cast Steel in Ceramic Molds. D. C. Ekey and E. G. Vogel. *Modern Castings,* v. 29, May, 1956, p. 116-118.

Ceramicast process adds flexibility to casting design and production by offering a quality range between the limitations of conventional sand castings and the unique accuracies of precision castings. Photographs, tables. (E12, CI)

301-E. Facts of Refractory Life. C. C. Lawson and Lyle R. Jenkins. *Modern Castings,* v. 29, May, 1956, p. 123-124.

Service life of eight refractories for air furnace bottoms compared with manufacturers' laboratory tests. Table. (E10, B19)

302-E. (French.) **Piping, Shrinkage Holes and Cavities in Castings.** J. Pascal. *Métallurgie,* v. 88, no. 3, Mar. 1956, p. 249 + 4 pages.

Solidification of castings, inclusion of gas absorbed from the sand, results of excess of blast. Graphs, table. (To be continued.) (E11, E25, CI)

303-E. (Spanish.) **Mineralogical and Technical Study of Spanish Molding Sands.** Vicente Aleixandre Ferrandis and Jaime Robredo Olave. *Instituto del Hierro y del Acero,* v. 9, no. 43, Feb. 1956, p. 118-145.

Sixteen molding sands and earths studied by several methods. Curves of compressive strength of green sands; humidity and weight by volume curves; relation between strength and other factors; permeability and granulometric characteristics; chemical analysis. Tables, pho-

tographs, graphs, micrographs. 21 ref. (E18)

304-E. (Spanish.) **Technique of Molding With Sands Agglomerated With Cement.** Luis Barbero Luna and Joaquin Tallada Cabello. *Instituto del Hierro y del Acero,* v. 9, no. 43, Feb. 1956, p. 146-168.

Advantages and disadvantages; origin and development of the technique abroad and in Spain; physical properties of sands; percentage of granulation and lixiviation; determining concentration of the cement; casting defects; use of technique for cast steel and bronzes. Tables, photographs, diagrams. (E18, CI, Cu)

305-E. Jobbing Production of Light-Alloy Castings. A. S. H. Sawers. *Foundry Trade Journal,* v. 100, Apr. 19, 1956, p. 195-206.

Normal melting procedure for aluminum is given with particular emphasis on the method of preparation prior to pouring; grain refining, fluxing, degassing and modification. Production of a number of castings from sand molds and by die-casting described in detail. Photographs, tables. (E general, Al)

306-E. Sealing Micro-Porosity in Light Metal Castings. Marvin Schneider and Henry Siesel. *Light Metal Age,* v. 14, Apr. 1956, p. 20-22, 31.

Vacuum-pressure impregnation method insures pressure tightness in castings where brittleness is of little consequence. Photographs. (E25, Q23, EG-a)

307-E. Application of the Phi Scale to the Description of Industrial Granular Materials. C. H. Bowen. *Mining Engineering,* v. 8; *American Institute of Mining & Metallurgical Engineers Translations,* v. 8, Apr. 1956, p. 420-424.

The phi scale is related to other systems and conversion is explained. Illustrations of use to specify foundry sand and other aggregate and powdered materials. Graph. 3 ref. (E18)

308-E. (Czech.) **Production of Castings Made From Acid-Proof Silicon Cast Iron.** Jan Hucka. *Slévarenstvi,* v. 4, no. 3, Mar. 1956, p. 68-74.

Equipment and methods, including casting design, molding, heat-treatment and repairing casting defects. Table, graph, diagrams. 11 ref. (E11, J general, CI)

309-E. (Czech.) **Importance and Different Systems of Foundry Sand Reclamation.** B. Kamenicky. *Slévarenstvi,* v. 4, no. 3, Mar. 1956, p. 74-79.

Principles of wet, dry, pneumatic and thermal reclamation procedures. Sand classification methods. Diagrams, photograph. 15 ref. (E18)

310-E. (French.) **Production of Boxes for Blown Cores.** Louis Marotine. *Fonderie,* 1956, no. 122, Mar. 1956, p. 98-106.

Materials used for boxes; number of impressions per box; protection of boxes against wear; removal of cores. Diagrams. (E21)

311-E. (German.) **Efficiency of a Cupola Furnace.** Hans Jungbluth. *Giesserei,* v. 43, no. 8, Apr. 12, 1956, p. 180-184.

Thermal and metallurgical efficiencies, smelting capacity and temperature in relation to amount of coke in the charge, effect of cupola losses on the economy of the process, favorable conditions of operation. Tables, graphs. 5 ref. (E10, CI)

312-E. (Italian.) **Designing From the Point of View of Obtaining Good Castings Without Internal Stresses, Porosity, Blowholes, Etc.** F. Velicogna. *Fonderia,* v. 5, no. 3, Mar. 1956, p. 115-122.

Solution of day-to-day design problems to obtain better and cheaper castings. Diagrams, photographs. 4 ref. (E11, E25, CI)

313-E. (Russian.) **Precision Casting of Heavy-Weight Articles.** N. G. Romanovskii. *Liteinoe Proizvodstvo,* 1956, no. 3, Mar. 1956, p. 5-6.

Carbon dioxide blast techniques employed in manufacturing precision casting molds in the U.S.S.R. and abroad. Use of quick-drying sand mixes with water glass. Table, photographs, diagrams. 7 ref. (E19, E15)

314-E. (Russian.) **Thermosetting Resins for Investment Molds.** K. M. Tkachenko and A. I. Bogdanov. *Liteinoe Proizvodstvo,* 1956, no. 3, Mar. 1956, p. 8-10.

Technological properties of various synthetic resins used as binders in investment molds. Classification system for industrial resins. Tables. (E15, E18)

315-E. (Book.) **Foundry Practices.** S. E. Rusinoff. 261 p. 1955. American Technical Society, Drexel Ave. at 58th St., Chicago 37, Ill. $6.50.

Various manufacturing processes applied to metal casting. Useful tables and extensive bibliography. (E general)

316-E. Hot-Blast Cupola Practice. Wilhelm L. Heinrichs. *American Foundrymen's Society, Preprint No.* 56-22, 1956, 10 p.

Development of basic-slag cupola practice from cold blast to continuous hot blast operation. Interrelations of the melting process; thermal and metallurgical reactions. Diagram, graphs, photographs, table. 13 ref. (E10)

317-E. Development of Hot-Blast Cupola Melting Technique in Europe. Ernst Loebbecke. *American Foundrymen's Society, Preprint No.* 56-33, 1956, 24 p.

Development of hot blast cupola melting techniques in Europe with particular reference to the metallurgical and thermotechnical problems which have primarily influenced this development. Diagrams, graphs, micrographs, photographs, tables. 57 ref. (E10)

318-E. Risering of Gray Iron Castings. E. J. Sullivan, Jr., C. M. Adams and H. F. Taylor. *American Foundrymen's Society, Preprint No.* 55-34, 1955, 5 p.

Continued theoretical and experimental studies of the shrinkages of various gray irons have consolidated understanding of the effects of carbon, silicon and other elements on shrinkage behavior, and have clarified the interrelationship between shrinkage, graphite structure and mold dilation. Diagram, graphs, photographs, tables. 2 ref. (E22, CI)

319-E. Temperature Drop in Pouring Ladles. Victor Paschkis. *American Foundrymen's Society, Preprint No.* 56-43, 1956, 13 p.

Deals with what is believed to be the greatest single contributing factor to temperature drop in transit from the melting furnace to the mold cavity. Diagrams, graphs, tables. 4 ref. (E23)

320-E. Effects of Charge Proportions, Furnace Atmosphere Flow Rate, and Melt-Down Time on Properties of Malleable Iron. A. H. Zrimsek, E. H. Belter and R. W. Heine. *American Foundrymen's Society, Preprint No.* 56-85, 1956, 10 p.

Effect of steel in the charge on chemistry of melting, casting properties, annealability and tensile properties; effect of flow rate of melting furnace atmosphere; effect of melt-down time and melting rate. Graphs, tables. 4 ref. (E10, CI)

321-E. Melting Malleable Iron With Pulverized Coal and Oil as Fuel. E. H. Nielsen. *American Foundrymen's Society, Preprint No.* 56-101, 1956, 5 p.

Purpose of the combined application of pulverized coal and oil as a fuel was to reduce oxidation during the melting down, heating up and tapping of the metal. Conclusions show savings in lower oxidation, higher fluidity, more uniform metal and lower cost of charging material. Diagrams, graphs. (E10, CI)

322-E. Recent Development of the Coreless Line Frequency Induction Melting Furnace in European Foundries. Otto Junker. *American Foundrymen's Society, Preprint No.* 56-102, 1956, 8 p.

Development and present use of coreless line frequency induction furnaces. Furnace is suitable for nonferrous metals, including magnesium and its alloys, is advantageous for turnings and chips and has found wide use for melting cast iron, particularly spheroidal graphite cast iron. Diagrams, photographs, table. 6 ref. (E10, E25, CI, Mg)

323-E. Casting Tolerances as Affected by Automation in the Machine Shop. E. L. Buchman. *American Foundrymen's Society, Preprint No.* 56-103, 1956, 3 p.

Problems resulting from automation with respect to material specifications, maintaining casting tolerances, metal control, raw material control and machinability. (E general, A5, G17)

324-E. Molding Sands, Molding Methods and Casting Dimensions. R. W. Heine. *American Foundrymen's Society, Preprint No.* 56-151, 1956, 8 p.

Conditions for controlling dimensions of castings. Diagrams, graphs, photograph. 3 ref. (E18, E19)

325-E. Does Sand Testing Give Us the Facts? R. W. Heine, E. H. King and J. S. Schumacher. *American Foundrymen's Society, Preprint No.* 56-152, 1956, 4 p.

A possible solution of correlating values found in testing by standard AFS test methods. Graphs, table. (E18)

326-E. Green-Sand Casting Finish. R. F. Meader. *American Foundrymen's Society, Preprint No.* 56-156, 1956, 6 p.

Important factors governing surface finish and closer dimensional tolerance. Graphs. (E11)

327-E. The Carbon-Dioxide Process. D. V. Atterton. *American Foundrymen's Society, Preprint No.* 56-162, 1956, 27 p.

Survey of the technical and practical developments of the carbon-dioxide process in Great Britain. Diagrams, graphs, photographs, tables. 12 ref. (E19, E21)

328-E. Core Making With CO_2 Process. Frank M. Scaggs. *American Foundrymen's Society, Preprint No.* 56-164, 1956, 4 p.

Twelve months experience at one company shows many advantages in the carbon dioxide process for better castings at less cost. Graph, photographs. (E21)

329-E. Some Considerations on the Tensile and Transverse Strength Testing of Shell Mold and Core Sands. P. J. Ahearn, F. Quigley, J. I. Bluhm and J. F. Wallace. *American Foundrymen's Society, Preprint No.* 56-168, 1956, 7 p.

Photoelastic evidence indicates excessive nonuniformity of stress distribution both across the critical section and at the gripping points in the standard tensile test briquet currently used for baked core and cured shell mold sand. Mechanical analysis of various tensile tests. Diagram, graph, photographs, tables. 8 ref. (E18, E16)

330-E. Cold Process for Resin Coated Foundry Sands. J. E. Bolt. *American Foundrymen's Society, Preprint No.* 56-169, 1956, 7 p.

Survey of the newest and fastest growing technique today in the shell molding field. Micrographs, photographs. 3 ref. (E16)

331-E. Inorganic Binders Solve Shell Molding Problems. Jose Navarro and H. F. Taylor. *American Foundrymen's Society, Preprint No.* 56-175, 1956, 10 p.

Problems arising from casting low-carbon steel in shell molds studied from standpoint of lowering mold cost, improving gating and risering technique and producing a more acceptable cast surface. Diagrams, graphs, photographs, tables. 7 ref. (E16)

332-E. Influence of Sand Distribution and Surface Coatings on Metal Penetration. *American Foundrymen's Society, Preprint No.* 56-186, 1956, 9 p.

Study of three basic types of nonproprietary core washes and several blends of sand for core specimens. Diagrams, graph, photographs, tables. 5 ref. (E19, E11, E21)

333-E. New Foundry Process—Single Glass Mold Smoothes Casting Wrinkles. P. M. Unterweiser. *Iron Age,* v. 177, May 10, 1956, p. 91-94.

New, all-in-one glass molds offer top precision, finer casting definition, blemish-free surface finish and a versatility that permits casting all metals, ferrous and nonferrous, in a common molding material. Photographs. (E16)

334-E. Gating and Risering of Investment Castings. C. M. Adams. *Metal Progress,* v. 69, May 1956, p. 58-60.

Gates and risers for investment castings must be designed as if the mold were made from sand and well insulated. Diagrams, graph. (E22, E15)

335-E. (Japanese.) **The Improvement in Properties of Molten Iron. I. On the Blow of Oxygen.** Isao Aoki and Tomojiro Tottori. *Iron and Steel Institute of Japan, Journal,* v. 41, no. 4, Apr. 1956, p. 407-411.

Controlled blowing of oxygen into molten iron improves quality of cast iron. Micrographs, graphs, tables. 6 ref. (E10, CI)

336-E. (Russian.) **On the Hydrodynamic Theory of Centrifugal Casting.** M. M. Chepinoga. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* no. 3, Mar. 1956, p. 92-105.

Refutes previous solution of the hydrodynamic problem of centrifugal casting and gives new solution for the problem of stationary motion of heavy viscous fluid in a rotating cylinder in the case of high Froude numbers. Table, diagrams, photograph. 3 ref. (E14)

337-E. (Russian.) **Study of the Liquation of Copper in Steel by Means of Radioactive Isotopes.** I. R. Krianin, S. N. Smolenskii, M. A. Studnits, and G. I. Babushkina. *Metallovedenie i Obrabotka Metallov,* no. 3, Mar. 1956, p. 20-22 + 1 plate.

Investigation of zonal activity in a casting. Distribution of copper in various sections of a casting of carbon steel alloyed with copper and in a manganese-silicon-copper steel. Distribution of copper in relation to strength and plasticity. Table, photograms. 5 ref. (E25, S19, Q23, Cu, ST)

338-E. (Spanish.) **The Izurdiaga Furnace for Obtaining Cast Iron From Industrial Ores and Residues.** Jose Antonio Morales Belda and Juan Antonio Berazaluce Altadill. *Instituto del Hierro y del Acero,* v. 9, no. 44, Mar. 1956, p. 241-247; disc., p. 247-249.

Furnace which is characterized by having an alternating circulation of gases in the ascending and descending direction, obtained by means of a single control valve. Furnace is used for producing cast iron on a small scale. Diagrams, photographs. (E10, CI)

339-E. Melting Equipment for Non-Ferrous Metals. J. H. Hunt and C. D. Campbell. *Australasian Engineer,* Feb. 1956, p. 53-62.

Main types of nonferrous melting

furnaces in use. Furnace requirements, principles, construction, performance, operation and metallurgical characteristics. Photographs, tables, diagrams. 42 ref. (E10, C5)

340-E. Casting Design for Machine Shop Efficiency. E. R. Tichauer. *Australasian Engineer,* Mar. 1956, p. 58-63.

Some general principles underlying the production of castings suitable for processing in the modern machine shop. Photographs, diagrams, graphs. (E general)

341-E. Cupola Slagging Processes and the Water Cooled Cupola Shell. J. Chappel. *Canadian Metals,* v. 19, May 1956, p. 50 + 3 pages.

Comparison of advantages and disadvantages of rear and front slagging and their relationship to the water-cooled cupola shell. Diagrams. (E10)

342-E. Running and Gating of Castings. W. Collinge. *Foundry Trade Journal,* v. 100, Apr. 26, 1956, p. 223-231.

Gating systems and layouts illustrated are applicable to any type of casting of similar design; the metal used has been accommodated successfully in the mold to produce castings free from general defects such as porosity, gas inclusions and scabbing. Photographs. (E22, CI)

343-E. Outline of Recommended Melting Practices for Small Heats. Nicholas J. Grant. *Industrial Heating,* v. 23, May 1956, p. 968 + 6 p.

What may be expected from factors of oxidation, hydrogen, deoxidation and temperature control to solve associated problems in melting small heats in induction or carbon-arc furnaces. Tables. (E10)

344-E. Use of Refractories in Low-Frequency Induction Furnaces for Melting Copper Alloys: I. Maurice Cook, C. L. M. Cowley and E. R. Broadfield. *Industrial Heating,* v. 23, May 1956, p. 1053 + 4 p.

Construction of a suitable refractory lining and features of furnace design and operation affecting its use. Diagrams. (To be continued.) (E10, Cu)

345-E. Behavior of Hydrogen in Metals Under the Influence of Direct Current. D. P. Lovtsov. *Henry Brutcher Translation No.* 3693, 9 p. (Abridged from *Liteinoe Proizvodstvo,* no. 9, 1955, p. 15-19.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 448-E, 1955. (E25, Al, Mg)

346-E. Investigations of the Carbon-Dioxide Process. R. Ziegler and G. Hammer. *Henry Brutcher Translation No.* 3696, 9 p. (From *Giesserei-Nachrichten,* no. 2, May 1955, p. 5-12.) Henry Brutcher, Altadena, Calif.

Insuring optimum core collapsibility and snake-out by control of such factors as fineness of sand, binder content and mulling time. Tables, graphs. (E18, E24)

347-E. (German.) **Hot Degassing of Lead Smelts.** Wilhelm Hofmann and Jurgen Maatsch. *Zeitschrift für Metallkunde,* v. 47, no. 4, Apr. 1956, p. 231-239.

Equipment for hot degassing of low-melting metals and the measuring method applied. With lead melts the amount of carbon dioxide and water set free were determined. Tables, graphs, diagram, micrograph. 22 ref. (E25, Pb)

348-E. (Italian.) **Collaboration Between the Research Office and the Foundry.** P. Rigaut. *Fonderia,* v. 5, no. 4, Apr. 1956, p. 161-167.

Joint role of research office and foundry in designing pieces and in obtaining samples on which will depend the cost and quality of the final product. Diagrams, photographs. (E general, C1)

349-E. (Polish.) **Casting of Iron Alloys in Permanent Molds.** Jozef Kuszewski. *Przeglad Odlewnictwa,* v. 6, no. 3, Mar. 1956, p. 65-71.

Properties of casts made in chill molds including outer appearance, crystalline structure and mechanical properties. Types of castings selected for casting in chill molds, including complex shapes. Design of chill molds, including arrangement of channels and fixed and movable parts. Economy features. Table, diagrams, photographs. 14 ref. (E12, E23, E25, CI)

350-E. (Spanish.) **Molding Sands.** Jose Navarro Alcacer and Jose Antonio Ancres Jimenez. *Instituto del Hierro y del Acero,* v. 9, no. 44, Mar. 1956, p. 277-289.

Properties that a molding sand must possess; examines 16 samples of sands from the Catalana region and discusses differential thermal analysis, dehydration and inhibition curves and refractoriness. Tables, diagrams, micrographs. 21 ref. (E18)

351-E. Zirconium in Cast Iron. E. A. Brandler. *Foundry,* v. 84, June 1956, p. 100-103.

Effects of zirconium ladle inoculation on machinability, structure,

hardness and strength. Tables, graph, photograph. 7 ref. (E25, G17, Q29, Q23, Zr, CI)

352-E. How Castings Can Fill Automotive Turbine Needs. Hiram Brown. *Foundry,* v. 84, June 1956, p. 104-107.

Design and casting problems in production of stainless steel turbine parts. Possible substitute alloys to reduce turbine engine costs. Photographs, diagrams, 2 ref. (E general, T25, SG-h, SS)

353-E. Processing of Pearlitic Malleable Iron. Lyle R. Jenkins. *Foundry,* v. 84, June 1956, p. 112-115.

Melting control and heat treatment procedures. Micrographs. (E10, J23, CI)

354-E. Detrimental Impurities in Brass Foundry Alloys. Harry St. John. *Foundry,* v 84, June 1956, p. 122-125.

Occurrence and treatment of tin, zinc, lead, iron, aluminum, silicon, magnesium, manganese, phosphorus, sulphur, carbon, hydrogen and oxygen. Photograph. (E general, Cu)

355-E. Patterns and Coreboxes for Shell Mold Castings. Harry Weaver. *Foundry,* v. 84, June 1956, p. 150 + 4 p.

Design and production details. Photographs. (E16, E17, E21, CI)

356-E. Dimensionally-Accurate Castings. J. Hill. *Foundry Trade Journal,* v. 100, May 10, 1956, p. 293-300.

Emphasizes phases of casting manufacture where maximum inaccuracies occur and where control must be established and standard conditions maintained to meet the degree of accuracy required. Graph, diagrams, tables, photographs. 10 ref. (To be continued.) (E 25)

357-E. Experience With Fast-Drying Bonding Materials. A. I. Donaldson. *Foundry Trade Journal,* v. 100, May 24, 1956, p. 351-359.

Results of experiments using rapid-drying oil-sand mixtures as a basis for cores. Carbon dioxide process for making molds and cores. Photographs. (E18, E21)

358-E. Thermal Environment. D. Turner, W. B. Lawrie, A. Eyden and A. Edwards. *Metal Industry,* v. 88, May 18, 1956, p. 413-416.

Development of a reverberatory furnace for melting light and nonferrous alloys. Diagrams, table. 1 ref. (E10)

359-E. Continuous Casting of Cast Iron Bars. G. J. Shaw. *Metal Treatment and Drop Forging,* v. 23, May 1956, p. 165-170.

Casting machines and methods, mold materials and design, mechanism of solidification, experimental casting machine and techniques, closed system of casting. Photograph, diagrams, table. (To be continued.) (E16, D9, CI)

360-E. (Czech.) Selecting Parts Suitable for Precision Casting. O. Kastanek. *Strojirenstvi,* v. 6, no. 5, May 1956, p. 331-336.

Modern methods of precision casting, their advantages and recent development. Specific features of new technology which must be taken into consideration. Tables, photographs. (E15)

361-E. (French.) The Uses of Synthetic Resins in the Foundry. *Fonderie,* no. 123, Apr. 1956, p. 160-164.

Special properties of urea-formaldehyde and phenol-formaldehyde resins. Use of resins in shell molding and manufacture of cores. Graphs. (E18, E16)

362-E. (French.) Production of Silicon Cast Iron by Reduction of Pyrite Ash, Without Agglomeration, in the Slag-Bath Electric Furnace. Giuseppe Zuliani. *Journal du Four Electrique,* v. 65, no. 2, Mar.-Apr. 1956, p. 59-62.

Operation of furnace, raw materials and production schedule. Diagrams, photographs, tables, graphs. (E10, CI)

363-E. (French.) Pipes, Shrinkage Holes, and Cavities in Castings. J. Pascal. *Metallurgie,* v. 88, no. 4, Apr. 1956, p. 347 + 5 pages.

Causes for occurrence in castings and results of long-term experiments. Diagrams, graphs, tables. 11 ref. (E25)

364-E. (German.) Importance of Croning Shell Casting in the Modern Foundry. Franz Pölzguter. *Giesserei,* v. 43, no. 11, May 24, 1956, p. 270-280.

Fundamentals of method, process and machinery, mechanization for production. Graph, diagrams, photographs. 40 ref. (E16)

365-E. (German.) Heavy Metals Casting by the Croning Method. Manfred Lottermoser. *Giesserei,* v. 43, no. 11, May 24, 1956, p. 281-285.

Resin and parting agent consumption; composition of quartz sand-resin mixture; advantages; preparation of shell mold. Tables, diagram, photographs, micrographs. (E16)

366-E. (Polish.) Defect Called a "Cold Drop", in Cast-Iron Castings. Roman Krzeszewski and Jan Marcinkowski. *Przeglad Odlewnictwa,* v. 6, no. 4, Apr. 1956, p. 104-109.

Problem of classifying this defect. Microstructural peculiarities of the bead or drop. Causes and elimination. Role of oxide formation in development of beads. Micrographs, diagram. 7 ref. (E25, M27, CI)

367-E. (Polish.) **Production of Spheroidal Cast Iron With High Elongation.** Jerzy Piaskowski. *Przeglad Odlewnictwa,* v. 6, no. 4, Apr. 1956, p. 110-117.

Survey of foreign and Polish casting methods for making spheroidal cast iron. Mechanical properties, microstructure, heat treatment. Addition of magnesium-base alloy ("electron") scrap. Micrographs, tables, diagrams. 18 ref. (E general, Q general, M27, J general, CI)

368-E. (Book.) **Zinc and Light Metal Die-Casting.** 149 p. 1955. European Productivity Agency of the Organisation for European Economic Co-Operation, 2 rue André-Pascal Paris, 16, France. $2.00

Reports observations of inspection team which visited the United States in 1954. Four phases of the industry were covered: die casting machines, die design and die construction; metallurgy; foundry practice; finishing die castings. (E13, Eg-a, Zn)

369-E. High-Silicon Aluminum Casting Alloy. John C. Wagner. *Metal Progress,* v. 69, June 1956, p. 91-92.

Addition of dilute phosphor copper reduces segregation and increases machinability. Micrographs, photographs. (E25, G17, Al)

370-E. What Iron Foundries Are Doing With the Injection Process. George P. Dahm. *Modern Castings,* v. 29, June 1956, p. 50-53.

Use of the injection process for desulphurization, increasing carbon content, improving mechanical properties. Micrographs, diagram, photographs. (E25, Q general, CI)

371-E. How Design and Operation Influence Cupola Emission. Ray C. Ortgies. *Modern Castings,* v. 29, June 1956, p. 54-56.

Design factors influencing emission of dust are bed height, charging doors, stack height, igniters, material handling and blower air volume. Diagrams, tables, photographs. (E10, A8)

372-E. Moisture Measuring on a Small Budget. George DiSylvestro. *Modern Castings,* v. 29, June 1956, p. 57.

For about $35 it is possible to build a moisture tester that will provide an accuracy within 0.1% in 5 min. Photographs. (E18)

373-E. You Can Make Clean, Sound Aluminum Alloy Castings. Jack Morgan. *Modern Castings,* v. 29, June 1956, p. 60-62.

Control of grain size, oxidation, alloy structure and alloy purity. Photographs. (E25, Al)

374-E. Sulphur Addition Makes Unusual New Iron. F. B. Rote, E. F. Chojnowski and J. T. Bryce. *Modern Castings,* v. 29, June 1956, p. 79-83.

Sulphur stabilizes carbides and permits production of thick metal sections free of primary graphite. Excellent casting surfaces are produced in either green sand or shell molds. Micrograph, graph. (E25, CI)

375-E. Economics of Investment Cast Vacuum Alloys. F. Kenneth Iverson. *Precision Metal Molding,* v. 14, June 1956, p. 130-135.

Analysis of costs and equipment. Diagram, table, photographs, graph. (E15, SG-h)

376-E. Some Experiments on the Production of Noduiar Cast Iron. S. N. Anant Narayan and S. Visvanathan. *TISCO,* v. 3, Apr. 1956, p. 48-52 + 1 plate.

Production of nodular iron by metallurgical measures during melting did not prove practicable. Calcium and barium salts did not induce formation of spheroidal graphite. Table. 17 ref. (E25, CI)

377-E. How to Deoxidize With Phosphor Copper. Robert A. Colton. *Foundry,* v. 84, July 1956, p. 80-82.

Informative data on what phosphor copper is, why it should be used and how to get the most benefit from its use. (E25, Cu)

378-E. Die Casting Magnesium. Sherwood H. Egbert. *Foundry,* v. 84, July 1956, p. 83-87.

West Coast firm incorporated some new techniques into its practice for successfully die casting magnesium. (E13, Mg)

379-E. Brass Casting Defects—Their Causes and Cures. Harry St. John. *Foundry,* v. 84, July 1956, p. 91-93.

Considers shift, crush, swell, variation in wall thickness, misrun, coldshut, hot cracks, sand wash, scab and sand blow. (E11, Cu)

380-E. Aspects of Corrosion-Resisting Steel Castings. W. G. Boustred. *Foundry Trade Journal,* v. 100, June 7, 1956, p. 409-412.

Types of corrosion-resisting steels; chemical composition; treatments for stabilization of stainless steel structures; manufacturing methods; melting and casting of alloys. (E general, SS, ST)

381-E. Use of Refractories in Low-Frequency Induction Furnaces for Melting Copper Alloys. II. Maurice Cook, C. L. M. Cowley and E. R. Broadfield. *Industrial Heating,* v. 23, June 1956, p. 1265 + 7 pages.

Types of refractories and methods of lining construction. (To be continued.) (E10, B19, Cu)

382-E. Notes on the Shape of Feeder Heads. N. K. Ipatov. *Iron and Steel Institute, Journal,* v. 29, June 1956, p. 293-294. (From *Liteinoe Proizvodstvo,* no. 3, Mar. 1955, p. 3-4.)

The important feature in the shape of a feeder head is not so much minimum surface or maximum degree of thickness as the rate of fall of the liquid metal level during the solidification process. (E23, E25)

383-E. The Use of Sodium Silicate in Steel Casting Molds and Cores. Robert D. Fenity. *Journal of Steel Castings Research,* no. 5, May 1956, p. 7-9, 14, 15.

Literature survey indicates successful use on a commercial scale in fabrication of metal casting molds and cores. Advantages are more rapid production and fewer sand defects. (E18, E19, E21, ST)

384-E. Durability of Foundry Sands and Properties of Deteriorated Foundry Sands. D. K. Faurschou. *Journal of Steel Castings Research,* no. 5, May 1956, p. 1-6, 15.

Testing procedures and equipment, properties at room and elevated temperatures, coatings on used sands. (E18, CI)

385-E. Automation in Gravity Die-Casting. *Light Metals,* v. 19, June 1956, p. 182-183.

Electronically controlled gravity casting machine permits production of nonferrous castings in permanent molds with unprecedented speed and precision. (E13, A5, Al)

386-E. The Pecoshell Automatic Shellmoulder. *Metalworking Production,* v. 100, June 8, 1956, p. 715-716.

Fully automatic single-station shell molding machine is particularly suited to large quantity production. (E16)

387-E. (Czech.) **Research on Czechoslovak Foundry Sands From 1950 to 1955.** Josef Dlezek. *Slévarenstvi,* v. 4, no. 5, May 1956, p. 145-154.

Principle task, development and organization of research on production and utilization of sands. (E18)

388-E. (Czech.) **Pouring of Steel Steam Chests for Turbines.** Frantisek Maran. *Slévarenstvi,* v. 4, no. 5, May 1956, p. 154-158.

Chromium-vanadium-tungsten steel is satisfactory from the point of view of mechanical properties. Atmospheric risers are used to increase metal yield. (E11, E23, Q general, CI)

389-E. (Czech.) **Imperfect Bonding in Compound Cast Bronzes.** Stanislav Lorenc. *Slévarenstvi,* v. 4, no. 5, May 1956, p. 158-162.

Cause of defect is seen in phosphorus content. The tin-containing bronzes for compound casting must therefore not exceed the given limit of phosphorus. (E general, Cu)

390-E. (Dutch.) **The Application of Chill and Wedge Tests During the Melting of Gray Cast Iron.** A. Bordes. *Metaalinstituut T. N. O.,* no. 38, Jan. 1956. 8 p.

Rapid tests suitable for controlling melting conditions and material properties. (E10, CI)

391-E. (Dutch.) **The Lining of Acid Cupola Furnaces.** A. Bordes. *Metalen,* v. 11, no. 8, Apr. 30, 1956, p. 175-181.

Raw material, patching, drying, wear, cost per ton and refractory-consumption data gathered while 24 acid-lined cupolas were operating under different conditions. (E10, B19)

392-E. CO_2 Hardening of Cores. Edward Magder. *Canadian Metals,* v. 19, June 1956, p. 40, 42-44.

Early experience in Canadian gray iron foundry shows worthwhile saving with further cost reduction expected, foundry operation better integrated and scrap losses cut. (E21, CI-n)

393-E. Application of Insulated Feeders to Sand Castings in Long-Freezing-Range Copper Alloys. R. S. Jackson. *Foundry,* v. 100, June 1956, p.487-493.

Insulating or exothermic sleeves are unlikely to be advantageous with most small or light-section castings, but may be economical with large casting where the use of feeders is essential to prevent shrinkage defects. (E23, E11, Cu)

394-E. Hot-Blast Cupolas in the Foundry. W. Heinrichs and W. Brüker. *Foundry Trade Journal,* v. 100, June 14, 1956, p. 463-464.

Construction, blast supply, control, economics and holding. (E10)

395-E. Glascast Process Precision Casting for Light Alloys. *Light Metal Age,* v. 14, June 1956, p. 18-20.

Low-cost one-piece molds, capable of withstanding extremely high heats

and sudden temperature changes, yield blemish-free castings with surface finishes of 20 to 40 microin. (E15, Al)

396-E. How They Poured the Biggest Aluminum Casting. Ken Calkins. *Light Metal Age,* v. 14, June 1956, p. 20-21.

The casting of airplane wing jig components containing as much as 37 cu. ft. of aluminum. (E11, Al)

397-E. Shell-Moulding Practice. D. F. Bailey. *Metal Industry,* v. 88, June 22, 1956, p. 520-522.

Open and closed-system coreblowing methods; mold blowing. (To be continued.) (E16)

398-E. Sand Mould Penetration Testing. II. A Practical Comparison of the Effectiveness of Sand Compaction by Several Foundry Moulding Techniques. D. H. Houseman. *Metallurgia,* v. 53, no. 320, June 1956, p. 249-252.

The mercury penetration tester was used to compare the effectiveness of sand compaction around a simple pattern by hand, pneumatic, jolt-squeeze and sand slinger ramming. (E18, E19)

399-E. Continuous Casting of Cast Iron Bars. G. J. Shaw. *Metal Treatment and Drop Forging,* v. 23, June 1956, p. 233-236.

Variables influencing the final bar when using the open system. (E23, CI)

400-E. Most Neglected Phases of Cupola Operation. W. R. Jaeschke. *Modern Castings,* v. 30, July 1956, p. 24-27.

Review of fundamentals including coke size, scrap iron and charging practice. (E10, CI)

401-E. Once There Was a Hard Spot in an Aluminum Die Casting. Donald L. Colwell and Oldrich Tichy. *Modern Castings,* v. 30, July 1956, p. 28-31.

Suggestions for improving machinability. (E13, Al)

402-E. Better Pouring Means Better Castings. Earl Solomon. *Modern Castings,* v. 30, July 1956, p. 49-50.

A wide variety of crucibles and ladles are available to fit the specific operation for which they will be used. (E23)

403-E. Soluble Cores. W. A. Dubovick. *Precision Metal Molding,* v. 14, July 1956, p. 38-40.

Where smooth, devious internal passageways are a functional requirement, soluble cores offer greater design latitude. (E15)

404-E. How to Control Temperature in Die Casting Dies. I. Mechanics of Heat Transfer. W. M. Halliday. *Precision Metal Molding,* v. 14, July 1956, p. 47 + 4 pages.

Factors affecting die temperature; heat transfer to and from a die. (E13)

405-E. (Czech.) **Chills for the Semicontinuous Casting of Aluminum and Alloys of Light Metals.** Otakar Rittich. *Hutnik,* v. 6, no. 2, Feb. 1956, p. 50-52.

Design of chills and factors affecting the service life of the chill mold. (E19, E25, Al)

406-E. (Russian.) **Intricate Chill Casting of Ferrous and Nonferrous Alloys.** B. Iu. Feigel'son. *Liteinoe Proizvodstvo,* 1956, no. 5, May 1956, p. 8-10.

Technical and economic advantages of chill casting complex parts by mechanical methods. (E16, Fe-n, EG-a)

407-E. (Russian.) **An Installation for Reclamation of Burned Mold Sand.** E. A. Glozman and G. A. Petrov. *Liteinoe Proizvodstvo,* 1956, no. 5, May 1956, p. 11-14.

A corona discharge separator for reclamation of the reusable portion of burned mold sand. (E18)

408-E. (Russian.) **Conditioning Influence of the Pouring Temperature on the Solidification of Steel Castings.** B. B. Guliaev, I. I. Lupyrev and P. E. Kovalenko. *Liteinoe Proizvodstvo,* 1956, no. 5, May 1956, p. 20-22.

An experimental study of kinetics of solidification and the temperature field of a steel casting allowed to cool in a sand mold. (E25, ST)

409-E. (Book.) **Steel Foundry Practice.** John Howe Hall. 496 p. 1955. Penton Publishing Company, Penton Building, Cleveland 13, Ohio. $12.00.

Thirteen chapters on as many different practices followed in the production of steel castings. (E general, CI)

410-E. The Influence of Mould Variables and Inhibitors on Mould Reaction in Aluminium-10% Magnesium Alloy. Marjorie Whitaker. *Institute of Metals, Journal,* v. 84, June 1956, p. 351-356.

The reaction can be reduced by avoiding coarse sand and ramming the mold as hard as is consistent with adequate permeability and other necessary characteristics. (E19, Al)

411-E. Shell-Moulding Practice. D. F. Bailey. *Metal Industry,* v. 88, June 29, 1956, p. 544-547.

Methods of manufacturing coated sands; runner systems; vertical and horizontal pouring; shell assembly. (E16)

412-E. (Czech.) **Experiences With the Use of Chemically Hardened Molding Mixtures in the Steel Foundry of Vitkovice Iron Works.** Artur Koval. *Slévarenstvi,* v. 4, no. 6, June 1956, p. 177-182.

Principles and practices in the use of chemically hardened sands for the production of large castings. (E18)

413-E. (Czech.) **Dies for Metal Casting.** Josef Sebl. *Slévarenstvi,* v. 4, no. 6, June 1956, p. 182-185.

Investigates choice of material for dies when metals are pressure cast, and principles for the determination of a gating system and venting of molds. Maintenance of dies is outlined, together with possibilities for reducing mold production costs. (E13)

(Czech.) **Types of Tears in Castings and Conditions Influencing Their Formation.** Josef Pribyl. *Slévarenstvi,* v. 4, no. 6, June 1956, p. 185-191.

Tears in castings can be attributed to either the base conditions influencing the origin of tension in castings in the dangerous temperature range, or to the secondary causes consisting of local or total lower material strength in castings. (E general, Q23)

415-E. (Dutch.) **The Lining of Acid Cupola Furnaces.** A. Bordes. *Metalen,* v. 11, no. 9, May 15, 1956, p. 197-202.

Factors affecting the durability of the lining in the melting zone; design of the furnace; comparison of various lining materials. (E10, B19, CI)

416-E. (French.) **Sofal Casting in A-S10G of a 1040-Kg. Crankcase for a Diesel Engine.** Charles Roinet. *Revue de l'Aluminium,* v. 33, no. 232, May 1956, p. 471-480.

Required a special molding study; pouring procedure described. (E11, Al)

417-E. (Hungarian.) **Experiments on Gray Cast Irons to Improve Their Quality by Double Inoculation.** Ferenc Varga and Kazmér Janossy. *Ontöde,* v. 7, no. 5, May 1956, p. 112-115.

Possibilities for improving the strength characteristics, increasing the reproducibility and identifying the carbide-stabilizing and graphite-forming materials most suitable for inoculation. (E25, CI)

418-E. (Polish.) **Production of Castings of Spheroidal Cast Iron Using Magnesium Additions in the Form of Rods.** Alojzy Jankowski. *Przeglad Odlewnictwa,* v. 6, no. 5, May 1956, p. 131-139.

Chemical composition of the cast iron, composition of charge for cast iron, apparatus for introducing magnesium rods into the melt, heat treatment of the castings, structural properties and strength characteristics before and after annealing and casting apparatus. (E10, E25, J general, Q23, CI)

419-E. (Swedish.) **Grain Refining in Cast Aluminum Alloys.** T. Malmberg, G. Coyet and G. Wardell. *Gjuteriet,* v. 46, no. 4, Apr. 1956, p. 45-52.

A titanium alloy and one containing titanium and boron generally had the best effect, but for an aluminum alloy rich in silicon only a zirconium alloy was effective. No improvement in tensile strength was found except for the duralumin test bars cast in dry sand molds. (E25, Q23, Al)

420-E. (Swedish.) **Degassing of Aluminum by Gas Bubbling.** M. Tikkanen and E. Erkko. *IVA Tidskrift för Teknisk-Vetenskaplig Forskning,* v. 27, no. 3, 1956, p. 96-102.

Merits and drawbacks of nitrogen and chlorine as reducing gases. (E25, Al)

421-E. Melting by Induction. I. Low Frequency Furnace Applications. Frank T. Chesnut. *Industrial Heating,* v. 23, July 1956, p. 1377-1378, 1380, 1382.

Types of induction melting furnaces. Applications to copper, zinc, aluminum, and cast and malleable iron. (To be continued.) (E10, Cu, Al, Zn, CI)

422-E. New Furnaces and Humidity Control Equipment in Mechanized Foundry Improve Quality of Iron Castings. *Industrial Heating,* v. 23, July 1956, p. 1410 + 4 pages.

Combination of modern heating equipment and hot blast and humidity control has resulted in significant benefits. Improved control of variables has led to greater uniformity of composition and more uniform annealing, resulting in castings which have structures more favorable to machinability. (E10, J23, G17, CI)

423-E. Use of Refractories in Low-Frequency Induction Furnaces for Melting Copper Alloys. III. Maurice Cook, C. L. M. Cowley and E. R. Broadfield. *Industrial Heating,* v. 23, July 1956, p. 1477 + 9 pages.

Discussion of lining life with causes for shorter life categorized according to failure through faulty construction or improper furnace operation. (E10, Cu)

424-E. Pocket Type Unit Diecasting Dies. *Mechanical World and Engineering Record,* v. 136, July 1956, p. 310-311.

Use of interchangeable cavity blocks housed like core-slides in pockets running to the edge of the bolster members greatly facilitates removal and replacement in the unit-die system described. (E13)

425-E. Big Castings Build a Business. *Steel,* v. 139, July 30, 1956, p. 104, 106.

Million-dollar foundry for big cement mold iron castings is mechanized to a degree that produces efficiency and economy without loss of versatility. (E11, CI)

426-E. Chambersburg Engineering Foundry Specializes in Large Precision Castings. Fred Mueller. *Steel Processing,* v. 42, July 1956, p. 393-395, 414.

Plant layout and operation of modern foundry. (E11)

427-E. (Czech.) **Manufacture of Cast-Iron Water Pipe** Vratislav Cap. *Hutnik,* v. 6, no. 4, Apr. 1956, p. 98-102.

Survey of casting methods, from the oldest to the most up-to-date, including specific problems of pouring techniques, cooling methods, types of heating furnaces and casting equipment. (E general, CI)

428-E. (Czech.) **Manufacture of Synthetic Sand Cores for Permanent Molds.** Miloslav Sourek. *Hutnik,* v. 6, no. 4, Apr. 1956, p. 102-105.

Materials and material costs, compositions and methods of preparing mixtures for core sands, effect of use of synthetic sand cores on service life of permanent molds. (E21, E18, E12)

429-E. (German.) **Beryllium in the Melting of Aluminum.** E. Nachtigall and H. Landerl. *Aluminium Ranshofen, Mitteilungen,* v. 4, no. 1, Apr. 1956, p. 15-18.

Advantages of small additions of beryllium to pure aluminum and to aluminum-magnesium alloys include reduced magnesium losses in melting alloys, elimination of the bad effect of mold moisture on the cast metal, improved coatings on dip-aluminized iron. (E10, E25, L16, Mg, Be, Al)

430-E. (Polish.) **Special or Usual Methods of Molding?** Platon Januszewicz. *Przeglad Odlewnictwa,* v. 6, no. 6, June 1956, p. 165-173.

Methods and amount of deviation from original dimensions, and specific uses and properties of various types of molds. Shell molding, high-pressure molding, plaster-casting, precision investment casting (including glass molds), and other mold materials and casting methods compared. (E general)

431-E. (Polish.) **Materials for Making Shell Molds: Properties, Supply Sources, and Preparation.** Zdzislaw Hertz and Jan Harpula. *Przeglad Odlewnictwa,* v. 6, no. 6, June 1956, p. 173-175.

Materials, such as sands and resin, for shell-mold making; separating and moistening media; methods of making molds; official standards for their use per ton of cast iron. (E18, E16, CI)

432-E. (Polish.) **The Status of Automation in Mold Mixture Processing.** Zdzislaw Izykowski. *Przeglad Odlewnictwa,* v. 6, no. 6, June 1956, p. 175-178.

Present state of mechanization and indicated trends in mixing and other operations. (E19)

433-E. (Portuguese.) **Notes on Precision Casting.** Lino A. De Lacerda Santos. *ABM (Boletim da Associacao Brasileira de Metais),* v. 12, no. 43, Apr. 1956, p. 105-115.

Precision casting by the lost-wax process, different phases from point of view of materials that can be used in Brazil. (E15)

434-E. (Portuguese.) **Molding of a Large Piece Cast in Steel.** Roberto Carlos Taralli. *ABM (Boletim da Associacao Brasileira de Metais),* v. 12, no. 43, Apr. 1956, p. 117-124.

Molding technique, solution of difficulties arising from a lack of specialized molders. (E19, E11, CI)

435-E. (Portuguese.) **Manufacture of Chill-Cast Iron Rolls Using an Electric Furnace.** Carlos Passeggio. *ABM (Boletim da Associacao Brasileira de Metais),* v. 12, no. 43, Apr. 1956, p. 125-133.

Equipment and operating procedures in Brazil. (E10, E11, E25, CI)

436-E. Patterns for Torpedo Tubes. Richard J. Porter. *Foundry,* v. 84, Aug. 1956. p. 76-79.

Specialized pattern equipment for centrifugally cast torpedo tubes calls for careful advance design and planning. (M17, E14)

437-E. New Permanent Mold Line Increases Piston Production. Robert

H. Herrmann. *Foundry,* v. 84, Aug. 1956, p. 70-75.

Operation of a revamped line containing 16 automatic machines, each capable of making 120 pistons per hr. (E12)

438-E. The Brass Foundry. XIII. Brass Casting Defects. Harry St. John. *Foundry,* v. 84, Aug. 1956, p. 88-91.

Analysis of ten defects. (E11, Cu)

439-E. Take a Fresh Look at Foundry Molding Sands. J. M. Anspach. *Foundry,* v. 84, Aug. 1956. p. 100-103.

Basic theory of molding sand properties and ability of auxiliary materials to modify these properties. (E19)

440-E. Indian Foundry Uses CO_2 Process to Advantage. C. A. Phalnikar. *Foundry,* v. 84, Aug. 1956, p. 140-142, 144, 146.

Sand practice, coremaking and moldmaking operations. Experience shows saving in time and reduction in defective castings. (E18)

441-E. Foundry Sand Practice. W. B. Parkes. *Iron & Steel,* v. 29, July 1956, p. 335-341.

A review of progress, 1939 to 1955. (E18, E19)

442-E. Pattern Dies for Investment Casting. D. E. Brooks. *Iron & Steel,* v. 29, July 1956, p. 349-352.

Pattern die types, factors affecting die design, die-making techniques. (E17, E15)

443-E. Layout and Design of Ingot Mold Foundries. Glenn W. Merrefield. *Iron and Steel Engineer,* v. 33, July 1956, p. 91-103; disc., p. 103-104.

Foundries must be designed to fit a number of conditions such as available area, metal, molding materials and many other factors in order to get economical production of molds. (E11, T5, CI)

444-E. What About Investment Cast Vacuum Alloys? F. Kenneth Iverson. *Modern Castings,* v. 30, Aug. 1956, p. 24-26.

Vacuum melting is moving from research lab to production to open fields for investment castings. Costs, production procedure and equipment details are discussed. (E10, E15, C25, D8)

445-E. More on Metal Flow in Molds. Goro Ohira. *Modern Castings,* v. 30, Aug. 1956, p. 28-29.

Tests were made concerning flow of metals in the runner and gates of test molds for aluminum cast at 750° F. (E22, Al)

446-E. The CO_2 Process. *Modern Castings,* v. 30, Aug. 1956, p. 33-48.

Survey of developments in North America and Great Britain. Use of carbon dioxide hardening for shell and other molds and cores. (E19, E21)

447-E. Aluminum Foundry Gets High Strength Without Heat Treatment. Arthur Van Newkirk. *Modern Castings,* v. 30, Aug. 1956, p. 56-57.

Heat treatment is eliminated by using new alloy, normal technique, standard equipment. (E11, Al)

448-E. Slip Casting of Stainless Steel Powder. I. W. G. Lidman and R. V. Rubin. *Precision Metal Molding,* v. 14, Aug. 1956, p. 40-41, 83.

Centrifugal casting was used in an investigation of the feasibility of applying slip casting techniques, using low metal content slips to powder metallurgy materials. (E14, H general, SS)

449-E. Shapes Unlimited. *Precision Metal Molding,* v. 14, Aug. 1956, p. 46-48, 66.

A precision casting method, using expendable patterns and monolithic molds, produces extremely complex nonferrous components with high accuracy. (E15)

450-E. When You Design Aluminum Bronze Permanent Mold Castings. Arthur Street. *Precision Metal Molding,* v. 14, Aug. 1956, p. 52-54, 76-77.

Characteristics, applications and design considerations. (E12, Al, Cu)

451-E. New Method of Impregnating. *Precision Metal Molding,* v. 14, Aug. 1956, p. 65.

Vacuum impregnation with a phenolformaldehdye bakelite solution salvages porous castings. (E25)

452-E. How to Control Temperature in Die Casting Dies. II. Causes of Thermal Unbalance. W. M. Halliday. *Precision Metal Molding,* v. 14, Aug. 1956, p. 73, 75.

Amount of heat transfer is a function of the time in which the flowing alloy is in direct contact with the die surfaces. (E13)

453-E. (French.) The Effect of the Pouring Temperature on the Size of the Grain of Gray Cast Iron. Michel Ferry and Jean-Claude Margerie. *Fonderie,* no. 125, June 1956, p. 223-231.

Size of the eutectic grain decreases with size of the piece and with a lower pouring temperature, except in irons of very low silicon content. Lowering the pouring tem-

perature affects the surface grain more than interior grain. (E25, E23, CI)

454-E. (German.) The Mechanism of Diminution of Grain in Aluminum Alloys. M. V. Mal'tsev. *Liteinoe Proizvodstvo,* no. 6, June 1956, p. 18-21.

Experimental data showing that the diminution of grain in aluminum and its alloys artef adidtion of small amounts of transition metals is due to formation of high-melting particles of intermetallic compounds acting as nuclei in the crystallization of the solid solution. (E25, Al)

455-E. (Russian.) Manufacture of Castings for Piston Rings. A. A. Svarika. *Liteinoe Proizvodstvo,* no. 6, June 1956, p. 3-4.

A method of manufacturing castings for piston rings from silicon-manganese cast iron. Best results were achieved by adding up to 30% scrap steel to the latter. (E general, T7, CI)

456-E. (Russian.) Methods of Pressure Treatment of Metal in the Liquid and the Plastic State and the Outlook for Their Further Development. V. M. Pliatskii. *Liteinoe Proizvodstvo,* no. 6, June 1956, p. 7-11.

A general survey of casting methods employing stepwise pressing and pouring as well as extrusion under pressure. Processes involved and equipment used. (E general, F24)

457-E. (Book.) Casting Kaiser Aluminum. 376 p. 1956. Kaiser Aluminum & Chemical Sales Inc., 919 North Michigan Boulevard, Chicago 11, Illinois.

Pig and ingot product data, principal casting methods, and characteristics of molten aluminum. Glossary of terms common to aluminum and its castings. (E general, C5, A10, Al)

458-E. Fundamental Considerations for Cupola Operation. W. R. Jaeschke. *Foundry Trade Journal,* v. 101, July 12, 1956, p. 39-45.

An early study of combustion in a cupola. Factors of cupola operation that affect the combustion and melting conditions. Emphasizes importance of coke quality, material size, stock distribution and "hang-ups." (E10, CI)

459-E. Shrinkage Defects in Grey-Iron Castings. I. C. H. Hughes and J. H. Gittus. *Foundry Trade Journal,* v. 101, July 19, 1956, p. 71-83.

Effects of pouring temperature, metal composition, mode of solidification and casting design upon shrinkage defects in gray iron castings. (E25, CI)

460-E. Cupola Experiments. K. G. Harris. *Foundry Trade Journal,* v. 101, July 1956, p. 101-110.

Investigation of such variables as combustion conditions, optimum charge-weights, charge distribution and lining erosion has enabled a controlled method of cupola operation to be evolved. (E10)

461-E. Fundamentals of Shell Moulding. P. H. R. B. Lemon. *Foundry Trade Journal,* v. 101, July 1956, p. 113-115.

Behavior of the sand-resin mix during the process; influence of basic sand and resin properties in the formation of the shell. (E16)

462-E. Can Molding Sands Be Ruined by Using the Carbon Dioxide Process for Cores? *Henry Brutcher, Translation No.* 3771, 7 p. (From *Giesserei-Praxis,* no. 18, 1955, p. 376, 371-373.) Henry Brutcher, Altadena, Calif.

Possibilities for a typical mixture. (E18, E21, Fe)

463-E. CO_2 Speeds Coremaking. *Steel,* v. 139, Aug. 6, 1956, p. 111-114.

Cores and molds made with a mixture of sodium silicate and sand harden in seconds when carbon dioxide gas is passed through them and can be poured off immediately. (E21, E19)

464-E. Internal Chills in Moulds for Steel Castings. G. W. Miles. *Foundry,* v. 101, Aug. 1956, p. 139-146.

Factors such as composition and positioning of chaplets, core support and metal-flow requirements. Investigation of extent to which different-sized inserts and chaplets fuse with the castings. (E25, E19, CI)

465-E. Influence of Magnesium Content on Layer Porosity and Tensile Properties of Sand-Cast Aluminium-Magnesium Alloys, B.S. 1490-LM10 and B.S. (Aircraft) L.ss. R. Jay and A. Cibula. *Foundry Trade Journal,* v. 101, Aug. 2, 1956, p. 131-142.

In bars containing 10.8 to 12% magnesium and poured from degassed melts, microporosity was uniformly distributed and the maximum tensile properties were obtained. (E25, Q27, Al, Mg)

466-E. Surface Defects in Some Sand-Cast Stainless Steels. Brian H. C. Waters, Carl Hayward and Howard F. Taylor. *Foundry Trade Journal,* v. 101, Aug. 2, 1956, p. 143-150.

Aluminum paint on mold surfaces gives promise as a means of preventing the "measles" defect. Explanation proposed. (E11, E25, SS)

467-E. Continuous Casting of Copper-Base Alloys to Finished Shapes.

Industrial Heating, v. 23, Aug. 1956, p. 1576 + 10 pages.

Casting process, fabrication advantages. (E16, C5, Cu)

468-E. Reducing the Phosphorus Content of Foundry Iron. R. I. Higgins. *Iron & Steel*, v. 29, Aug. 1956, p. 373-378.

Basic physical and chemical considerations. (E25, CI)

469-E. (Czech.) **Chaplets in Gray Iron Castings, Their Dimensions and Use.** Miroslav Bednarik. *Slévarenstvi*, v. 4, no. 7; *Prace Ceskoslovenského Vyzkumu Slévarenského*, v. 3, no. 32, July 1956, p. 233-238.

Permissible specific pressure between the chaplet head and the casting wall and the permissible load of the chaplet stems were determined. (E19, E21, CI)

470-E. (Czech.) **Melting of Gray Iron in Basic Cupola.** *Slévarenstvi*, v. 4, no. 7; *Prace Ceskoslovenského Vyzkumu Slévarenského*, v. 3, no. 33, July 1956, p. 239-248.

With increasing basicity of the slag, the desulphurization of cast iron also increases, but only with melting difficulties. (E10, CI)

471-E. (French.) **Determination of the Casting Time in the Foundry.** M. Charles Trenclé. *Fonderie*, no. 126, July 1956, p. 251-266.

A theoretical study, with mathematical developments and practical conclusions based on modern physics, of the casting time of foundry specimens of whatever shape, size, or metal or alloy, with a view to eliminating the costly empirical approach in casting. (E general, A5)

472-E. (Italian.) **The Making of Castings in Aluminum Bronze.** *Fonderia*, v. 5, no. 6, June 1956, p. 287-294.

A study of the component metals of this alloy with variation of their quantities or with addition of other metals for practical purposes. Description of the casting process. Centrifugal casting. (E11, E14, Cu)

473-E. (Italian.) **Die Casting of Zinc and Light Alloys. From OECE Report No. 155. III.** *Fonderia*, v. 5, no. 6, June 1956, p. 321 + 4 pages.

Various methods used in removing castings, improvements made in recent years, solution of some technical difficulties in the feeding and the cooling process. (To be continued.) (E13, Zn, EG-a)

474-E. (Italian.) **Technical Problems in Casting and Their Solutions.** *Fonderia*, v. 5, no. 6, June 1956, p. 331, 333.

Use of synthetic sand, design of a furnace for the artificial aging of castings, determination of molding sand permeability. (E18, J27)

475-E. (Polish.) **Carbon Steel Cast in Green Sand.** Edmund Janicki. *Przeglad Odlewnictwa*, v. 6, no.7, July 1956, p. 194-202.

Chief problems connected with making molds for green sand casting; pouring and preparation of the steel. Role of porosity, release of gases, fluidity and resistance of the mold. Evaluation of methods of preparing gates. Properties of sands. (E19, E11, E18, E22, CI)

476-E. (Polish.) **Green Molding Sand for Heavy Castings.** Tadeusz Rzepa and Zdzislaw Wertz. *Przeglad Odlewnictwa*, v. 6, no. 7, July 1956, p. 202-208.

Advantages of green sand casting. Native materials for molds. Methods of testing mold materials. Means of improving durability of molds for heavy castings. Preparation of sands, proportions, mixing procedures. (E18, E19)

477-E. (Polish.) **Production of Medium Sized Cast Iron Castings in Synthetic Sand.** Edward Reszel. *Przeglad Odlewnictwa*, v. 6, no. 7, July 1956, p. 208-215.

Reasons for using synthetic sands, raw materials, composition and properties of synthetic sands, filling the mold, defects in synthetic sand castings and resulting economies. (E18, E11, CI)

478-E. The Risering of Nodular Iron. R. C. Shnay and S. L. Gertsman. *Canadian Metals*, v. 19, Aug. 1956, p. 48-51.

Effect of pouring temperature on shrink depth. (To be continued.) (E22, CI)

479-E. Aluminum Impellers Cast With Plaster Cores. Anthony Polizzoto. *Foundry*, v. 84, Sept. 1956, p. 104-107.

Acceptable cast aluminum impellers for aircraft must withstand a speed of 52,000 rpm. with a 20% overspeed. Plaster cores are the key to adequate internal smoothness. (E21, A1)

480-E. Casting Camshafts in Shell Molds. Kenneth L. Mountain. *Foundry*, v. 84, Sept. 1956, p. 124-128.

Mechanized line that features three automatically controlled blow-hot press machines of special design has more than doubled output of camshafts. (E16)

481-E. Sand Control Important in Production of Chemical Castings. Edwin Bremer. *Foundry*, v. 84, Sept. 1956, p. 129-133.

Accurate control of molding sand properties was found to be essential in production of high-silicon iron and alloy steel chemical castings. (E18, CI)

482-E. Magnesium Wing Sections Cast on Production Basis. Lewis B. Reed. *Foundry,* v. 84, Sept. 1956, p. 134-137.

Folding wing section for guided missile weighs 163 lb. A one-piece, hollow-cast part, it requires no machining on the skin. (E11, Mg)

483-E. Pewter Castings Produced With Antique Molds. Harold E. Bourassa. *Foundry,* v. 84, Sept. 1956, p. 210, 213.

History of the art, types of pewter, pewter casting procedure. (E12, Sn)

484-E. Development and Application of a Foundry Test for Assessing Shrinkage Behaviour in Grey Cast Iron. J. Grice and J. T. Berry. *Foundry Trade Journal,* v. 101, Aug. 16, 1956, p. 159-170.

Effect of change of feeder-volume surface-area ratio and depth of unsoundness in a 6-in. side cube in a medium-phosphorous gray iron. Temperature gradients during solidification and corresponding shrinkage defects. (E25, CI)

485-E. Chalk Talk on Diaphragm Molding. T. E. Barlow. *Modern Castings,* v. 30, Sept. 1956, p. 24-27.

Principles of a molding method which distributes pressure evenly over entire mold regardless of its size. (E19)

486-E. Surface Flowability—Key to Smoother Castings. James McConachie and H. H. Fairfield. *Modern Castings,* v. 30, Sept. 1956, p. 30-32.

Finishes are directly correlated with loose sand flowability. The Kennedy flowability test is a practical guide in the formulation and control of sand mixtures. (E18)

487-E. A Tensile Bar Shell Mold for Light Alloys. R. C. Harris and K. L. Herrick. *Modern Castings,* v. 30, Sept. 1956, p. 49-51.

Complications of thermal gradients and solidification rates have been met with new design. (E16, E25, EG-a)

488-E. New Nodular Iron Process. Harry K. Ihrig. *American Society for Metals, Transactions,* v. 49, *Preprint No.* 7, 1956, 13 p.

Process uses the halides of alkali, or alkali-earth metals, in combination with reducing agents such as calcium. Chemical analyses, mechanical properties and photomicrographs of such nodular irons are given. (E25, Q general, CI)

489-E. (Dutch.) **The Hardening of Molds and Cores of Cement Sand by Carbon Dioxide. I. The Hardening Process.** H. G. Levelink **II. Practical Application of Carbon Dioxide Through Pipes.** J. P. G. Bruschke. *Metalen,* v. 11, no. 15, Aug. 15, 1956, p. 322-326.

Principles and applications of the carbon dioxide treatment or cement sand where, with only one or two core-boxes, continual production of heavy cores has been obtained. (To be continued.) (E18)

490-E. (Hungarian.) **Basic Materials of Core-Bonding Oils and the Technology of Oil-Bonded Cores.** Gyorgy Hevenesi and Janos Szekeres. *Ontöde,* v. 11, no. 7, July 1956, p. 145-155.

Hungarian investigations by various methods, such as cold tests, hot tests, chemical examination and physicochemical determinations. Types of bonding agents, their setting mechanism. Extensive experimental data. (E21)

491-E. (Italian.) **The Melting and Casting of Bronzes and Brasses.** *Fonderia,* v. 5, no. 7, July 1956, p. 353-358.

Critical review of recent experimental work. Recommends best practical methods. (E general, Cu)

492-E. (Book.) **The Running and Gating of Sand Castings.** R. W. Ruddle. 183 p. 1956. Institute of Metals, 4 Grosvenor Gardens, London, S.W.1, England.

A review of the literature, covering experimental methods of studying flow of metals, fluid dynamics, and various types of gating systems. (E22, E11)

493-E. (Book-German.) **The Foundry and Its Techniques.** W. Rapp and M. Pasternak. 247 p. 1955. Fachbuchverlag, Leipzig.

A handbook for foundry workers. Casting steel, gray iron, and malleable iron. Smelting furnaces for steel and cast iron. Change in alloy components in remelting. Nonferrous metals. Molding magnesium. Corrosion and surface protection of magnesium alloys. (E general)

494-E. Casting Copper. M. G. Neu. *Metal Industry,* v. 89, Aug. 31, 1956, p. 163-166.

Some aspects of high-conductivity copper casting production: theoretical considerations, melting, deoxidants, duplex deoxidation and feeding. (E general, Cu)

495-E. Recent Developments in the Art of Precision Casting. Nicholas J.

Grant. *Metal Progress,* v. 70, Sept. 1956, p. 113-117.

Processes using disposable patterns of wax, plastic or mercury compete with others using a thin-walled mold in which the casting solidifies quickly to a fine grain. (E15)

496-E. Mold Construction Allows Design Freedom. Samuel Lashutka. *Precision Metal Molding,* v. 14, Sept. 1956, p. 74-76.

Design of a typical mold casting, mold components, sequence of casting operations. (E12)

497-E. Sulzer Precision Castings. Walter Sulzer. *Sulzer Technical Review,* v. 38, no. 1, 1956, p. 1-13.

Details of the investment casting process for intricate parts of high surface finish in ferrous metals or high-grade alloys. (E15)

498-E. Penetration of Liquid Titanium Into Graphite. V. P. Elyutin, M. A. Maurakh and Yu. A. Pavlov. *Henry Brutcher Translation No.* 3797, 8 p. (From *Izvestiya Akademii Nauk SSSR, OTN,* no. 5, 1955, p. 129-132.) Henry Brutcher, Altadena, Calif.

Study of titanium loss owing to penetration into pores of graphite crucibles as function of time in holding titanium in the liquid state, of the effects of overheating the metal (in a vacuum furnace), and the nature of the graphite used as crucible material, using radiotitanium. (E10, C5, Ti)

499-E. Evaluation of Casting Processes. Hiram Brown. *Institute of British Foundrymen,* v. 48, p. 45A-52A; disc., p. 52A-59A.

Properties of castings and advantages for many applications. Precision casting methods, shellmolding. (E general)

500-E. Recent Aluminium Casting Developments. L. Fletcher. *Institute of British Foundrymen,* v. 48, p. 91A-97A; disc., p. 97A-100A.

Case histories illustrate the width and diversity of application for all aluminum castings. Examples include several made by special techniques or new processes. (E11, T general, Al)

501-E. Metal and Mould Research on Steel Castings. I. Solidification Mechanism. J. A. Reynolds and A. Preece. **II. Mould- and Core-Bonding Agents.** J. M. Middleton and J. White. *Institute of British Foundrymen,* v. 48, p. 101A-119A; disc., p. 119A-125A.

Macroporosity and microporosity, control of shrinkage unsoundness, constitution and properties of bonding clays, moisture resistance of dielectrically baked cores, influence of molding materials on incidence of hot tearing. (E25, E18, CI)

502-E. Chemical Reactions in the Cupola. G. A. H. Jungbluth and K. Stockkamp. *Institute of British Foundrymen,* v. 48, p. 141A-160A; disc., p. 160A-166A.

Thermodynamic principles, behavior of iron oxide, silicon, manganese and suphur, effects of hot blast temperature. (E10, CI)

503-E. Comparative Study of Melting Furnaces Used in Iron Foundries. Borut Marincek. *Institute of British Foundrymen,* v. 48, p. 167A-174A; disc., p. 174A-176A.

The cold blast cupola, hot blast cupola, arc furnace and induction furnace as melting units in the foundry are considered and compared against the background of increasing coal prices. (E10, CI)

504-E. Metallurgical Studies of the M.B.C. and ADS Cupolas. A. DeSy, Robert Doat, Roger Balon and Lucien Winandy. *Institute of British Foundrymen,* v. 48, p. 177A-186A.

The ADS cupola has control potentialities only over the elements carbon and sulphur and thus is complementary to the metallurgical blast cupola. (E10, CI)

505-E. Behaviour of Moulding Sands at High Temperatures. W. B. Parkes and R. G. Godding. *Institute of British Foundrymen,* v. 48, p. 187A-197A; disc., p. 197A-200A.

Construction of equipment for rapid and uniform heating of sand test-pieces made possible measurements of expansion of rammed sand and also its strength and deformation under conditions closely resembling those found on surface of sand mold during pouring. (E18, CI)

506-E. Spalling of Green-Sand Moulds and Its Relation to Casting Defects. H. Pettersson. *Institute of British Foundrymen,* v. 48, p. 201A-216A; disc., p. 216A-217A.

Spalling mechanism discussed in respect to the temperature gradient that is formed in the mold, surface layers of different character that are formed due to this gradient, expansion curve of the sand, migration of moisture. (E18, CI)

507-E. Effect of Mould Material on the Solidification Rate of Cast Metals. *Institute of British Foundrymen,* v. 48, p. 218A-236A; disc., p. 237A-243A.

Coarseness of sand, ramming density, moisture content and presence of coal-dust substantially influence solidification rate. (E25, E19, CI)

508-E. Nomogram for Fairly Hot Non-Alloyed Iron Cast in Ordinary Dry-Sand Moulds. Sv. Thegel. *Institute of British Foundrymen,* v. 48, p. 255A-264A.

A nomogram relating thickness of castings, composition and hardness. (E11, Q29, CI)

509-E. Moulding in an Indian Foundry. S. G. Athanikar. *Institute of British Foundrymen,* v. 48, p. 265A-270A; disc., p. 270A-272A.

Some details of procedures adopted for molding four typical castings in the medium-to-large weight range. (E19, CI)

510-E. A Jobbing Investment Foundry in South Africa. J. Steele. *Institute of British Foundrymen,* v. 48, p. 273A-284A; disc., p. 284A-286A.

The "Shaw" molding process, design and construction of an electric melting furnace, production of alloy steel by crucible melting, a paraffin-fired muffle for mold baking and heat treatment of castings, casting mild steel and typical products. (E general, CI)

511-E. Ingates. *Institute of British Foundrymen,* v. 48, p. 306A-318A; disc., p. 318A-323A.

Equations relating rate of flow to shape and size of gating system, experiments for determination of loss factors, turbulence and back-pressure effects. (E22)

512-E. Place of Shell Moulding in the Foundry. B. H. C. Waters. *Institute of British Foundrymen,* v. 48, p. 1B-10B.

Shell molding techniques, advantages and limitations, comparison with rival processes. (E16)

513-E. Aspects of Steelfoundry Practice. H. Hart. *Institute of British Foundrymen,* v. 48, p. 11B-24B.

Details of various methods adopted to meet increased demands of precision and soundness. (E general, CI)

514-E. Cores and Moulds by the CO_2 Process. A. Talbot. *Institute of British Foundrymen,* v. 48, p. 25B-34B; disc., p. 34B-36B.

Procedures, equipment and costs involved in conversion of foundry to carbon dioxide process. Emphasis is on saving of core-stove and drying-oven space. (E19, E21)

515-E. "Pop-off"-Type Moulding Boxes for the Mechanized Production of Light Castings. A. J. Crook. *Institute of British Foundrymen,* v. 48, p. 37B-44B.

Description of the full mechanization of a foundry where previously loose-pattern molding methods had been used. The "pop-off"-type molding box was used to advantage by adapting it to cope-and-drag plates. (E19, CI)

516-E. Carbon-Dioxide Process. D. V. Atterton. *Institute of British Foundrymen,* v. 48, 45B-55B; disc., p. 55B-58B.

Historical review, sand properties and reactions to treatment, methods of introducing the gas, surface finishing molds and castings, collapsibility of sand. (E19, E21)

517-E. Defects in Steel Castings. R. A. Boustred. *Institute of British Foundrymen,* v. 48, p. 59B-67B.

Possible causes and remedies for blowholes, pinholes, shrinkage, burn-on, hot tears and scabs. (E11, CI)

518-E. Production of Castings for Woodworking Machinery. R. Higgins. *Institute of British Foundrymen,* v. 48, p. 68B-77B.

Foundry plant layout, equipment, operation and typical production. (E11)

519-E. Castings Versus Weldments. H. Mottram. *Institute of British Foundrymen,* v. 48, p. 78B-88B.

Design considerations, machinability, raw materials, comparative costs, composite assemblies. (E general, G17, K general)

520-E. Melt-Quality Tests. I. Copper-Base Alloys. A. R. French. **II. Academic Aspects.** V. Kondic. **III. Light Alloys.** J. Wood. *Institute of British Foundrymen,* v. 48, p. 89B-110B; disc., p. 110B-113B.

Historical introduction; how testing of melt and metal quality was first conceived. Relates applicability of prepouring tests to the main alloy groupings—high-tensile brasses, aluminum bronzes and copper-tin alloys (including leaded gunmetals). Testing in each group examined from standpoint of service properties desired, metallurgical characteristics of the particular alloy and factors which influence these characteristics. (E25, Cu, Sn)

521-E. Large Cast-Iron Pipe Manufacture. I. Pattern Control. J. Bell. **II. Loam-Block Pattern.** S. Lloyd. *Institute of British Foundrymen,* p. 48, p. 114B-117B; disc., p. 117B-118B.

Pattern-store layout and organization, core construction, preparation of loam-block patterns, manufacture

of shell cores with particular reference to design of tackle. (E17, E21, E16, CI)

522-E. Production of Sheet (and Strip) Direct From Molten Cast Iron. V. V. Gusev. *Henry Brutcher Translation No.* 3097, 12 p. (From *Liteinoe Proizvodstvo*, no. 11, 1952, p. 5-8.) Henry Brutcher, Altadena, Calif.

Production of 0.02 to 0.04-in. thick sheet direct from molten cupola iron in sizes of up to 20 by 28 in. Iron composition, properties and structure, design details, casting system, sheet forming unit and annealing practice. (E general, CI)

523-E. (Dutch.) **Hardening of Sand Molds and Sand Cores of Cement With Carbonic Acid Gas. III. Practical Application by Introducing Carbonic Acid Gas Through the Hollow Core.** L. A. Roos. *Metalen*, v. 1, no. 16, Aug. 31, 1956, p. 349-350.

Method used with 190-cm. cores of a 25 and 21 cm. section, and with 140-cm. cores. Application to smaller cores. (E18)

524-E. (German.) **Typical Defects in Aluminum Castings and Indications of How They Can Be Avoided.** R. Irmann. *Aluminium*, v. 32, no. 9, Sept. 1956, p. 540-544.

A step-by-step study of quality of the pigs, the melting process, feeding the mold, solidification in the mold. (E25, Al)

525-E. (German.) **Reflections on the Process of Grain and Structure Refining of Magnesium Alloys, and on the Use of Magnesium-Aluminum Alloys With High Ductility at Room Temperature.** H. Fr. Honsel and P. Zimmermann. *Aluminium*, v. 32, no. 9, Sept. 1956, p. 545-549.

Degassing of magnesium alloys is compared with aluminum-magnesium-silicon-alloys, gray cast iron and silicon. Proposes that specially treated magnesium-aluminum alloys may replace magnesium-zirconium-alloys. (E25, Al, Mg, Si, Zr)

526-E. (German.) **Construction and Operative Characteristics of Modern Pressure Die Casting Machines.** J. Baur. *Aluminium*, v. 32, no. 9, Sept. 1956, p. 554-558.

Development of the methods of pressure die casting. Peculiarities and advantages in comparison with other traditional methods of casting, especially hot and cold-chamber machines. (E13, Al)

527-E. (Spanish.) **White Hot Cracks in Steel Castings.** Renato Garlatti and Jeronimo Villagarcia. *Instituto del Hierro y del Acero*, v. 9, no. 48, July 1956, p. 748-762.

Cracks appear above the solidus line. Deoxidation, the resistance of mold and core, and their designs, are important factors in preventing cracking. (E25, Q26, CI)

528-E. Foundry Science. II. The Risering of Nodular Iron. R. C. Shnay and S. L. Gertsman. *Canadian Metals*, v. 19, Sept. 1956, p. 40 + 5 p.

The shrink depth of hypereutectic nodular iron castings varies greatly with the pouring temperature. Hypo-eutectic irons are little affected. (E22, CI)

529-E. Modern Practice Typified by New Gray Iron Foundry. William G. Gude. *Foundry*, v. 84, Oct. 1956, p. 104-111.

New seven-million dollar heavy jobbing foundry incorporates latest improvements in methods and equipment. (E general, A5, CI-n)

530-E. Gating and Risering in the Brass Foundry, XV. Harry St. John. *Foundry*, v. 84, Oct. 1956, p. 112-115.

Techniques of gating and risering to obtain sound brass and bronze castings. (E22, Cu)

531-E. You Can Improve Your Sand. Earl E. Woodliff. *Foundry*, v. 84, Oct. 1956, p. 122-125.

Sand control can be accomplished only when many interacting factors are integrated effectively. (E18)

532-E. A Chemical Laboratory Need Not Be Expensive. Frank J. Versagi. *Foundry*, v. 84, Oct. 1956, p. 126-130.

For less than $200 the small brass foundry can set up a simple laboratory to control copper content of melts. (E25, S11, Cu)

533-E. Basic Principles Applicable to Steelmaking in Founding Practice. T. A. Cosh and R. J. Sarjant. *Foundry Trade Journal*, v. 101, Sept. 6, 1956, p. 251-264.

Role of physical chemistry in various steelmaking processes. (E10, D general, ST)

534-E. CO_2 Process: Formation and Dissolution Mechanism in Relation to the Silicate Bond. C. Starr. *Foundry Trade Journal*, v. 101, Sept. 6, 1956, p. 265-266.

Chemical nature of sand-silicate bond when making foundry molds and cores. Effects of three groups of metal casting temperatures. (E18)

535-E. Steel Castings Manufacture. Control Factors. E. Longden. *Iron & Steel*, v. 29, Sept. 1956, p. 415-421.

Progressive freezing, gating and feeding, methods control, standardization techniques. (To be continued.) (E general, CI)

536-E. Ironfoundry Metal Melting Furnaces. Frank Dunn. *Iron & Steel,* v. 29, Sept. 1956, p. 433-436.
Reviews improvements in cupola, rotary, electric, air and crucible furnaces. (E10, CI)

537-E. Rotary Furnaces. A. J. Gibbs Smith. *Iron & Steel,* v. 29, Sept. 1956, p. 437-438.
Application to batch melting high-duty cast iron for shell-molding process. (E10, E16, CI)

538-E. Microporosity in Steel Castings. H. Poetter. *Iron & Steel,* v. 29, Sept. 1956, p. 443-445.
Causes and control of microporosity. Cooperation between foundrymen and the designer is essential. (E general, ST)

539-E. Moulding Characteristics of Jubbulpore Sands. R. M. Krishnan and B. R. Nijhawan. *Journal of Scientific & Industrial Research,* v. 15, sec. A, July 1956, p. 314-327.
Green, yellow and white sands were chemically analyzed, examined microscopically and otherwise tested to determine characteristics. (E18)

540-E. Progress in the Introduction of Shell Molding at a Specialty Steel Foundry. R. J. Cowles and D. C. Ekey. *Journal of Steel Castings Research,* no. 6, Sept. 1956, p. 1-6.
"Pocking" phenomenon and its controlling factors. (E16, CI)

541-E. The Simplified Method Used to Riser a Ten-Inch Pipe Line Valve. Alan G. Linle. *Journal of Steel Castings Research,* no. 6, Sept. 1956, p. 11-15.
Calculations involved in determining number and dimensions of risers. (E22)

542-E. Production of Titanium Castings. R. A. Beall, F. W. Wood, J. O. Borg and H. L. Gilbert. *U. S. Bureau of Mines, Report of Investigations* 5265, Aug. 1956, 42 p.
Construction and operation of four different casting furnaces, all utilizing consumable-electrode arc heating and water-cooled copper crucibles. Mold design, electrode fabrication and deep-pool production. (E10, Ti)

543-E. (French.) **Influence of Casting Temperature on the Mechanical Characteristics of Sand Cast Unalloyed Pig Irons.** M. Michel Ferry. *Fonderie,* no. 127, Aug. 1956, p. 306-320.
Influence of casting temperature on casting density, cell dimension, tensile strength, modulus of elasticity and hardness. (E11, Q general, CI)

544-E. (German.) **The Jungbluth Reticule Diagram and the Conversion of Material in the Cold Blast Cupola.** Wilhelm Patterson. *Giesserei,* v. 43, no. 18, Aug. 30, 1956, p. 486-497.
Verification of the diagram, practical results, effects of variables. (E10)

545-E. (German.) **The Problems of Melting Cast Iron in the Induction Furnace.** Borut Marincek. *Giesserei,* v. 43, no. 18, Aug. 30, 1956, p. 527-536.
Physical requirements and economic efficiency of the induction furnace as compared to the cupola. (E10, CI)

546-E. (German.) **The Importance of Compression Pressure in High-Pressure Die Casting.** Fritz Richter. *Giesserei,* v. 43, no. 18, Aug. 30, 1956, p. 540-547.
Effect of pressure on casting quality. (E13)

547-E. (German.) **Silicate Solution as Binder for the Production of Large Cores.** W. Schmidt and W. Philipp. *Giesserei,* v. 43, no. 18, Aug. 30, 1956, p. 592-593.
Advantages of use of air-hardening alkali-silicate corebinders. (E21)

548-E. (Italian.) **Magnesium Alloys in the Foundry.** E. Crepaz. *Fonderia,* v. 5, no. 8, Aug. 1956, p. 405-415.
Composition and characteristics of alloys, methods of production, description of magnesium and magnesium-alloy sand casting, chill casting and die casting. (E general, Mg)

549-E. (Polish.) **Possibility of Improving Quality of Castings by Use of Ultrasonics.** Jozef Tabin. *Przeglad Odlewnictwa,* v. 6, no. 8, Aug. 1956, p. 230-233.
Review of experiments performed to date on the use of ultrasonic vibrations to influence grain size while the metal of the casting is solidifying. Process makes it possible to substitute castings for forgings in many cases. (E25)

550-E. (Russian.) **Continuous Casting of Pipes.** A. D. Popov. *Liteinoe Proizvodstvo,* no. 8, Aug. 1956, p. 7-8.
Difficulties usually encountered and their solution. Pipes are cast with walls 7-10 mm. thick. Description of the equipment and methods for "liquid broaching". (E14, CI)

551-E. (Russian.) **Semi-Automatic Device for Preparing Shell Cores.** M. I. Rotenberg and V. I. Soldatenko. *Liteinoe Proizvodstvo,* no. 8, Aug. 1956, p. 19-21.
Cutting costs by using special portable electric heaters, and a working area and equipment designed for greater efficiency. (E16, E21)

552-E. (Russian.) **Chill Casting of 10-1 Bronze Into Large Caliber Bushings.** A. F. Nasankin. *Liteinoe Proizvodstvo,* no. 8, Aug. 1956, p. 29-30.

Details of construction and use of mold for casting bushings with an inside diameter greater than one meter. (E25, Cu)

553-E. Significance of Particle Size of a Grain Refining Agent. *Light Metals,* v. 19, Sept. 1956, p. 294-296. (From *Zeitschrift für Metallkunde,* v. 47, no. 2, Feb. 1956, p. 97-101.)

Previously abstracted from the original. See item 279-E, 1956. (E25, Al, Si)

554-E. A Hot Subject: Casting Uranium. F. L. Cuthbert and W. E. Shaw. *Modern Castings,* v. 30, Oct. 1956, p. 32-33.

Foundry methods and equipment used to produce nuclear-fuel alloys on high production scale. (E10, U)

555-E. Steel Wheels in Green Sand. Larry DeBoer. *Modern Castings,* v. 30, Oct. 1956, p. 34-37.

Description of mold, heat treatment, hub cooling, cleaning, machining, inspection. (E11, E19, G17, S13, ST)

556-E. Core Blowing. A. M. Clark. *Modern Castings,* v. 30, Oct. 1956, p. 41-56.

History, equipment, components, new principles. (E21)

557-E. How to Control Temperature in Die Casting Dies. IV. Water-Cooled Sprue Bushings. W. M. Halliday. *Precision Metal Molding,* v. 14, Oct. 1956, p. 105-112.

Design considerations. (E13)

558-E. (Book.) **Proceedings of the Institute of British Foundrymen.** D. Pratt, editor, v. 48, 476 p. 1955. Institute of British Foundrymen, St. John Street Chambers, Deansgate, Manchester 3, England.

Contains thirty papers from many different countries and on a variety of subjects related to the foundry. Individual papers are abstracted separately. (E general)

559-E. Ladle Additions to Grey Cast Iron for High Duty Parts Without Disturbance of Normal Production. C. R. van-der Ben. *Alloy Metals Review,* v. 8, Sept. 1956, p. 2-6.

Simple method of producing the higher grades of B.S.S. 1452 in a foundry not specially equipped for them. (E25, CI-n)

560-E. Receivers, Tapping Systems and Slag Disposal. *Foundry Trade Journal,* v. 101, Sept. 27, 1956, p. 349-355.

Five major tapping systems applied to the cupola; consideration of the continuous type. Slagging systems, refractories, advantages and disadvantages, metal composition. (To be continued.) (E10, E23)

561-E. Receivers, Tapping Systems and Slag Disposal. *Foundry Trade Journal,* v. 101, Oct. 4, 1956, p. 379-390.

Considers both fixed and portable, heated and nonheated receivers, with data on relative efficiencies and effect on metal composition and structure. Surveys fuels and fuel consumption, refractories control methods, slag containers, granulation systems. (E23)

562-E. New Advances Swell Shell Molding Uses. I. O. W. Winter. *Iron Age,* v. 178, Oct. 11, 1956, p. 108-110.

Metal sections 4 in. thick can be cast in ¼-in. shell molds; 100-lb. castings are now believed economically feasible. (E16, Cu)

563-E. A New Composition for Fast Malleable. A. L. Boegehold. *Metal Progress,* v. 70, Oct. 1956, p. 73-74.

A pinch of tellurium in high-silicon malleable produces white iron even in large sections; 0.025% bismuth plus 0.003% boron does the same thing and eliminates objectionable "foundrymen's halitosis". (E25, B22, CI)

564-E. Expendable Molds for Titanium Castings. A. L. Feild, Jr., *Metal Progress,* v. 70, Oct. 1956, p. 92-96.

Titanium castings can be produced free of internal porosity and with negligible surface contamination in molds made from a new graphite-base mixture. (E18, Ti)

565-E. Casting Design. Bernhard Rogge. *Product Engineering,* v. 27, Oct. 1956, p. 190-193.

Basic design considerations and recommended drafting practices. (E general)

566-E. New Process for Making Nodular Iron. *Steel,* v. 139, Oct. 22, 1956, p. 83-84.

Adding sodium and magnesium chlorides to molten iron with calcium silicides as a reducing agent is used to produce an easily machinable and ductile iron without annealing. (E25, CI)

567-E. (Hungarian.) **Desulphurizing Experiments With Different Basic Cupola Linings.** Ferenc Varga. *Öntöde,* v. 7, no. 9, Sept. 1956, p. 201-209.

A study of the chemistry involved. (E10)

568-E. (Spanish.) **The Use of Sodium Carbonate in Metallurgy.** Juan Grau.

Paper from "XXVIII Congreso Internacional de Quimica Industrial". v. I. Saez, p. 541-553.

Theory of the desulphurization of cast iron, its industrial technique, modern application. (E10, CI)

569-E. Steel Castings Manufacture. Control Factors. E. Longden. *Iron & Steel,* v. 29, Oct. 1956, p. 457-462.

Allowances for contraction, machining and manufacturing errors. Process and methods control cards. (E general, CI)

570-E. Thin Permanent-Mould Castings. Design and Production Problems. A. M. Petrichenko. *Iron & Steel,* v. 29, Oct. 1956, p. 473-477. (From *Liteinoe Proizvodstvo,* 1955, no. 7, p. 4-8.)

Design of castings, molds and casting systems. Prevention of chilling. Increasing strength of molds. (E12)

571-E. Foundry Mould Surfaces. H. M. Walter. *Iron & Steel,* v. 29, Oct. 1956, p. 485-486.

Test for the depth of skin dryness based on electrical conductivity of sand. (E19)

572-E. High Temperature Sand Tests. Harry W. Dietert, Victor M. Rowell and Alex L. Graham. *Modern Castings,* v. 30, Nov. 195, p. 50-51.

Mold surface failure, test equipment, scabs, rat-tails, buckles, veining, cuts and washes. (E18)

573-E. Design Tips for Shell Pattern Equipment. H. Weaver. *Modern Castings,* v. 30, Nov. 1956, p. 48-49.

Pattern materials, pattern plates, design of stripping pins and core boxes. (E17, E16)

574-E. Precision Castings in a Bigger Way. Adam Dunlop. *Modern Castings,* v. 30, Nov. 1956, p. 50-51.

Principles and molding methods involved in process producing quality steel castings weighing up to 700 lb. with no apparent limit on size. (E15, CI)

575-E. Fast Aluminum Melting. F. L. Turk. *Modern Metals,* v. 12, Oct. 1956, p. 54.

New dry hearth furnace speeds production, improves working conditions, and cuts cost of aluminum castings. (E10, Al)

576-E. (Czech.) Production of Welding Rods by Means of Casting. Zdenék Lehky, Zdenék Eminger and Karel Löbl. *Slevarenstvi,* v. 4, no. 9, Sept. 1956, p. 257-263.

Casting process for welding rods of cobalt-chromium-tungsten alloy and other combinations. (E11, T5, Co, Cr, W)

577-E. (Czech.) Gases in Aluminum and Its Alloys. *Slevarenstvi,* v. 4, no. 9, Sept. 1956, p. 268-272.

Current technological control methods for the gasification of aluminum alloys; degasification methods. (E25, Al)

578-E. (Dutch.) Behavior of Damp Molding Sand Subjected to Sudden Heating and the Formation of Scab. H. G. Levelink. *Metalen,* v. 11, no. 18, Sept. 1956, p. 402-408.

A surface layer of sand was subjected to rapid heating at 1300° C. Reactions caused by expansion capacity, adhesivity and type of components were observed. Principle applied to casting forms. (E18)

579-E. (German.) Addition of Sawdust to Molding Sand. Horst Eppstein. *Giesserei,* v. 43, no. 20, Sept. 27, 1956, p. 656-658.

Comparison of addition of coal dust, tar and sawdust to molding sand and the advantages of the latter. (E18)

580-E. (Polish.) "Adequate" Coal Dust in Molding Sands. Stefan Jarzebski. *Przeglad Odlewnictwa,* v. 6, no. 9, Sept. 1956, p. 286-292.

Behavior of the coal dust in sand explained; mold may be strengthened by this procedure. (E18, CI)

581-E. (Polish.) Exothermic Mixtures for Risers. Kazimierz Korecki and Tadeusz Welkens. *Przeglad Odlewnictwa,* v. 6, no. 9, Sept. 1956, p. 292-300.

Exothermic mixtures for nonferrous metals, nodular cast iron and cast steel are obtained by an alumino-thermic reaction. (E22, E25, CI, EG-a)

582-E. Effect of Vibration on Aluminum Investment Castings. D. W. Levinson, A. H. Murphy and W. Rostoker. *Light Metal Age,* v. 14, Oct. 1956, p. 26.

Preparation of molds. Compares castings vibrated before removal from casts and those not vibrated, the former being considered superior. (E15, Al)

583-E. Pontiac Crankshafts Are Shell-Molded Castings. R. C. Robinson. *Machinery,* v. 63, Nov. 1956, p. 154-161.

Operations of the highly mechanized foundry line are followed from molding the shell to final inspection of the crankshaft. (E16, CI)

584-E. (Italian.) **Automation in the Foundry. The Use of Thin Cases in Molding.** *Fonderia,* v. 5, no. 9, Sept. 1956, p. 459-462.

From preparation of sand to transportation of completed casts, through automation. Use of thin resin and sand molding cases. Advantages of the method. (A5, E general)

585-E. (Italian.) **Use of Carbon Dioxide in the Foundry.** *Fonderia,* v. 5, no. 9, Sept. 1956, p. 463-465.

Preparation of molding sands with a viscous and liquid alkaline binder, and further hardening of the cores and molds with carbon dioxide with no subsequent burning necessary. Advantages and limitations of the method. (E19)

SECTION F

PRIMARY MECHANICAL WORKING

1-F. Slitting Highly-Finished Stainless Steel. *Engineering,* v. 180, Oct. 14, 1955, p. 542-544.

Follows process of decoiling, slitting, inspection and coiling of slit strip. Diagram, photographs. (F29, G15, SS)

2-F. Combustion Systems in Steel Plants. Fred S. Bloom. *Metal Progress,* v. 68, Nov. 1955, p. 111-115, 200.

Details of high efficiency, high heat transfer, multiple fuel heating systems used in metallurgy. Diagrams, photographs. (F21)

3-F. Light Alloy Forgings for the Aircraft Industry. R. H. Daniels. *Metal Treatment and Drop Forging,* v. 22, Oct. 1955, p. 421-424.

Development of dies, forging design and manufacture, and inspection and testing during past 10 yr. Photographs, diagrams. (F22, EG-a)

4-F. (German.) **Principles of Roll Speed Calculation.** Z. Wusatowski. *Metallurgie,* v. 5, no. 9, Sept. 1955, p. 282-289.

Considers speed of a pass and other factors associated with it in continuous mills for hot and cold rolling. Diagrams, tables. 14 ref. (F23)

5-F. Mechanized Copper Tube Production. *Metal Industry,* v. 87, Nov. 18, 1955, p. 421-423.

Equipment and operating procedures of drawing plant. Photographs. (F26, Cu)

6-F. Production of Hot-Rolled Transformer Sheet With Low Core Losses, I-II. M. Markuszewicz, J. Groyecki and A. Zawada. *Henry Brutcher Translation Nos.* 3573-3574, 36 p. (Abridged from *Prace IMH,* v. 6, no. 3, 1954, p. 105-119.)

Production process for low core loss sheet which gives a consistently high-quality product without cold rolling, or annealing in a hydrogen atmosphere. Experiments to further improve quality of sheet. Graphs, micrographs, tables. 40 ref. (F23, P16, ST)

7-F. (Russian.) **Mode of Operation of Vertical Rolls of Universal Rolling Mill Machinery.** L. F. Molotkov, G. E. Tsukanov and E. M. Bortunov. *Stal',* v. 15, no. 10, Oct. 1955, p. 914-915.

Speed ratios of horizontal and vertical rolls; relation of number of passes, roll edge pressures, reduction ratios, and other parameters. Tables. (F23)

8-F. (Russian.) **Intensification of Reduction Rate for an 1150-MM. Blooming Mill.** A. P. Chekmarev, V. L. Pavlov, V. M. Klimenko, G. E. Tsukanov, E. M. Bortunov and P. A. Vashchilo. *Stal',* v. 15, no. 10, Oct. 1955, p. 916-921.

Studies to speed up rate of rolling steel blooms without impairing quality. Microstructure and mechanical properties of blooms. Tables, micrographs, photograph, diagram. 8 ref. (F23, M27, Q general, ST)

9-F. Stresses and Strains in Cold-Extruding 2S-O Aluminum. E. G. Thomsen and J. Frisch. *ASME, Transactions,* v. 77, Nov. 1955, p. 1343-1351 disc., p. 1351-1353.

Flow patterns as represented by instantaneous velocity vectors in an inverted extrusion process of a solid cylindrical bar appear to be identical for both lead and 2S-O aluminum. Axial stress distribution in the billet had the same shape as that determined with lead. Diagrams, graphs. 8 ref. (F24, Q25, Al)

10-F. Application of Rotary Hearth Furnace for Heating Plate Mill Slabs. F. C. Schoen. *Iron and Steel Engineer,* v. 32, Nov. 1955, p. 116-123; disc., 123-124.

Installation at Alan Wood Steel Co. with heating and operation data. Diagrams, tables, photographs. (F21, ST)

11-F. Forge Furnace Research. *Metal Treatment and Drop Forging,* v. 22, Nov. 1955, p. 459-464.

Report of research program. Photographs. (F22, F21)

12-F. Lubrication and Cold Extrusion of Steel. Ernest C. Morse. *Modern Industrial Press,* v. 17, Nov. 1955, p. 36-39.

Summary of selection and application of lubricants in cold extrusion operations. Photographs. (F24, F1)

13-F. Multiple-Die Forging. R. G. Moore. *Product Engineering,* v. 26, Dec. 1955, p. 154-157.

New technique extends size range of forgings. Design data given on tolerances and physical properties. Photograph, graph, diagrams, table. (F22, Q general, Al)

14-F. Extruders Feel Metal Pinch. *Steel,* v. 137, Nov. 28, 1955, p. 69.

Increased use of aluminum extrusions results in possible dearth in supply of metal. Photograph. (F24, Al)

15-F. Why the Forging Failed. *Steel,* v. 137, Nov. 21, 1955, p. 96-98.

Hydrogen embrittlement was found to be the cause of failure of a forged low-pressure turbine spindle shaft. Photographs, micrograph, diagram. (F22, Q23, S21)

16-F. Keeping Ahead of Extrusion. *Steel,* v. 137, Nov. 28, 1955, p. 102-103.

Aluminum extrusion presses and procedures; capacity and capabilities. Photographs, table. (F24, Al)

17-F. Cold Rolling of Phosphated Steel Strip. W. Lueg and K. H. Treptow. *Henry Brutcher Translation No.* 3583, 23 p. (From *Stahl und Eisen,* v. 75, no. 17, 1955, p. 1085-1092.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 229-F, 1955. (F23, F1, ST)

18-F. (German.) **The Tube Reducing Process as Viewed From the Point of View of Deformation.** Friedrich-Wilhelm Neumann and Dieter Hancke. *Stahl und Eisen,* v. 75, no. 22, Nov. 3, 1955, p. 1452-1460.

Roll pass design discussed for reducing mills with a free choice of the number of revolutions. Methods of calculation and equations for checking the calculated data. Graphs, diagrams, table, photographs. (F26)

19-F. (Russian.) **Influence of Certain Metallurgical Factors on Specific Losses of Hot-Rolled Transformer Steel.** N. F. Dubrov. *Fizika metallov i metallovedenie,* v. 1, no. 1, 1955, p. 143-148.

Effect of sulfur content on nature of sulfur inclusions and structure of steel; role of aluminum and manganese and maximum contents allowable in relation to annealing temperatures; relation between oxygen content and the kinetics of grain growth; annealing of steel. Graphs, micrographs, tables. 7 ref. (F23, J23, N3, ST)

20-F. Fabrication and Welding of Arc-Cast Molybdenum. Norman E. Weare, Robert E. Monroe and George W. Rengstorff. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* BMI-1037, Sept. 1955 46 p.

Improved materials and procedures for producing molybdenum weldments with good room-temperature ductility. Diagrams, graphs, photographs, micrographs, flowsheet, tables. 7 ref. (F general, G general, K general, Q23, Mo)

21-F. High Speed Rod Rolling at Continental Steel Corp. Don C. Horsman. *Iron and Steel Engineer,* v. 32, Dec. 1955, p. 53-59; disc., 59-61.

Production gain is accomplished through multistrand rolling, higher speeds and larger bundles. Equipment and methods. Photographs. (F27, ST)

22-F. Electric Equipment for Reversing Hot Strip Mills. C. C. Thomas. *Iron and Steel Engineer,* v. 32, Dec. 1955, p. 92-109.

Design and construction details for a number of mills now in use in U. S. Diagrams, tables, graphs. (F23)

23-F. Specialty Rolling Mills Have Versatile Control. A. J. Winchester and D. E. Abell. *Iron and Steel Engineer* v. 32, Dec. 1955, p. 144, 147, 148, 150.

Design and construction details of a reversing hot mill and a reversible cold mill with unique control equipment. Photographs, diagram. (F23, ST)

24-F. Flying Shears for Bars and Billets. I. Mechanical Design Features. II. Flying Shears for Bars and Billets. R. Stewartson and S. R.

Phelps. *Iron and Steel Institute, Journal,* v. 181, Nov. 1955, p. 232-262 + 5 plates.

Effect of the two different duties on design considered, together with basic linkages for each range, based on oscillatory and rotary motion. Applications and types of electrical controls used. Tables, graphs, diagrams, photographs. 14 ref. (F29, Fe, ST)

25-F. Roller-Straightening of Sections and Rails. W. A. J. Dinwoodie. *Iron and Steel Institute, Journal,* v. 181, Nov. 1955, p. 263-272 + 2 plates.

Theory of straightening by bending and figures from an actual load investigation. Machine design and alternative arrangements. Practical use of straighteners and guides to correct layout given. Diagrams, photographs. (F29, ST)

26-F. Production of Gas Turbine Blades by Precision Forging. E. B. Wells. *Machinery (London),* v. 87, Dec. 2, 1955, p. 1292-1297.

Furnaces, other equipment, methods used. Photographs. (F22, SS, Al, Ni, Ti)

27-F. Extruded Aluminium. *Metal Industry,* v. 87, Dec. 2, 1955, p. 463-465.

Plant and practice at Latchford Works of British Aluminium Co. Ltd. Photographs. (F24, Al)

28-F. Shell Making With the New Look. Robert F. Huber. *Steel,* v. 137, Dec. 19, 1955, p. 88-91.

Forging equipment and operations. Newly designed heat treat handling equipment utilizes completely automatic cycle to harden, quench, draw and cool the shells. Photographs. (F22, J26, ST)

29-F. (Czech.) Importance of Degree of Deformation in Forging Operations. M. Sulc. *Strojirenstvi,* v. 5, no. 8, Aug. 1955, p. 589-591.

Influence of degree of deformation on mechanical properties of steel, effect of forging action on grain size. Equations for determining degree of deformation under various types of forging techniques. Graphs, tables, diagram. 3 ref. (F22, Q general, AY, CN)

30-F. Aluminium Extrusion Factory Production Plant Housed in the Product. *Engineering,* v. 180, Dec. 9, 1955, p. 799-801.

New British plant, roofed and walled in aluminum, which houses two large extrusion presses as well as a variety of auxiliary equipment for heat treatment, straightening, and other purposes. Photographs. (F24, T26, Al)

31-F. Water-Lubricated Wood Rolls Bevel Aluminum. A. F. Schub. *Iron Age,* v. 176, Dec. 29, 1955, p. 68-69.

Conventional design advantages, cost factor and speed of a home-grown, two-stand machine. It replaces ten-stand equipment on short production runs. Photographs. (F23, Al)

32-F. Ingot Heat Conservation. Cooling of Rimming-Steel Ingots Between Teeming and Stripping. M. D. Ashton, R. F. Perkins and L. H. W. Savage. *Iron and Steel Institute, Journal,* v. 181, Dec. 1955, p. 303-312.

Method for reducing fuel consumption in soaking pits, increasing pit availability and increasing mold life by stripping all ingots at earliest practical time. Graphs, diagrams, photographs, tables. 10 ref. (F21, ST)

33-F. Glass Lubricant in the Extrusion of Steel. J. Sejournet and J. Delcroix. *Lubrication Engineering,* v. 11, Nov.-Dec. 1955, p. 389-396.

Molten glass is the lubricant in the Ugine-Sejournet process for extruding steel under conditions of high temperature and pressure and facilitates the flow of the metal being deformed. Special conditions under which glass acts as a lubricant, special requirements of this application and responsive properties of glass in this use. Diagrams, photographs, graphs. (F24, F1, ST)

34-F. The Rolling of Metals and Alloys. VIII. Resistance to Deformation During Hot Rolling. E. C. Larke. *Sheet Metal Industries,* v. 32, no. 344, Dec. 1955, p. 939-944.

Plant employed to obtain values of the resistance to deformation needed for computing hot rolling loads. Explanation of construction of groups of curves which relate this property to the rate of deformation, the working temperature and the magnitude of the reduction effected. Graphs, photograph, tables. (To be continued.) 2 ref. (F23)

35-F. (Czech.) New Measuring Apparatuses in Rolling Mills. Adolf Uncovsky. *Hutnické listy,* v. 10, no. 11, Nov. 1955, p. 676-678.

Instruments for distance indication of the roll adjustment of the housing, automatic cutting control of pneumatic shearing and registration of the rolling pass plan. Photographs, diagrams. 4 ref. (F23)

36-F. (French.) Compactness and Oxygen Content of Effervescent Basic Bessemer Steel Ingots Hot-Rolled Into Strip Steel. M. Nepper. *Revue universelle des mines,* v. 98, ser. 9, no. 11, Oct. 1955, p. 516-520.

Research on flat ingots for rolling into strip steel shows that the compactness of effervescent steel is a direct function of degassing of the pouring basin. Graph, tables, photograph. (F23, ST)

37-F. (German.) **Scaling of Copper Sheets at 400° C.** Karl Löhberg and Fritz Wolstein. *Zeitschrift für Metallkunde,* v. 46, no. 10, Oct. 1955, p. 734-737.

Method of investigating relationship between scaling and cold rolling rate and between texture and deformation stress, time factor of thick and thin cold rolled sheets. Findings and relation to quality of copper sheet. Table, graphs, diagram. 10 ref. (F23, F21, Cu)

38-F. Rolling, Forging Facilities Meet Diversified Needs. R. C. Humphrey. *Iron Age,* v. 176, Dec. 15, 1955, p. 103-105.

Facilities at Westinghouse's new plant are adaptable and multi-purpose, permit wide range of developmental and production work. Photographs. (F22, F23, ST)

39-F. Ceramic Insulation Reduces Roll Maintenance. *Iron Age,* v. 176, Dec. 15, 1955, p. 110.

Roll sleeves, packed with long-life ceramic fiber insulation, hold high-alloy sheets at rolling temperature from furnace to two-high mill. Sleeves spin up to 300 r.p.m. Photograph. (F23)

40-F. Close-Tolerance Forgings. George W. Motherwell. *Aircraft Production,* v. 17, Dec. 1955, p. 478-481.

Progress in improvement of accuracy and reduction of machining. Some of the problems of producing forgings with small draft angles and to close tolerances, and some specific examples of work already done. Photographs, diagram. (F22)

41-F. Axle Shaft Manufacture. *Automobile Engineer,* v. 45, Dec. 1955, p. 570-572.

Description and operation of electric upsetting and press forging production unit. Diagrams, photographs. (F22, AY)

42-F. Hot-Rolled Gear Wheels. A. D. Kuzmin, M. V. Vasilchikov, and M. V. Barbarich. *Engineers' Digest,* v. 16, Dec. 1955, p. 575-577. (Translated from *Vestnik Mashinostroyenya,* v. 35, no. 3, Mar. 1955, p. 53-56; no. 9, Sept. 1955, p. 41-44.)

Production process for the hot rolling of gears with a quality entirely satisfactory for engineering purposes. Diagrams, graph. (F23)

43-F. Production of Turbine Compressor Blades by Forging. *Light Metals,* v. 18, Dec. 1955, p. 414-415.

Process for forging titanium blades, for the axial compressor of a prototype gas turbine, which eliminates galling. Diagrams, photographs. (F22, Ti, AY)

44-F. Snap-On Couplings Cut Mill Down Time. *Steel,* v. 137, Dec. 26, 1955, p. 68, 71.

Problem of coupling and uncoupling of fluid lines in roll changes and a solution to this problem which involves quick-connect and disconnect couplings. Diagrams, photographs. (F23, AY)

45-F. (Czech.) **New Techniques in the Manufacture of Drawn Wire.** Frantisek Palisek. *Hutnik,* v. 5, no. 10, Oct. 1955, p. 305-308.

Advantages, economy, problems of the method. Tables. (F28, Al, Cu, ST)

46-F. (French.) **Technological Aspect of the Shaping of Metals by Cold Deformation.** Raoul Molle. *Revue universelle des mines,* v. 11, ser. 9, no. 11, Nov. 1955, p. 568-582.

Analysis of the process of cold deformation of metal. Methods of metal forming based on cold deformation such as rolling, stamping, pressing, extrusion and deep drawing. Optimum condition of operation, fields of application, advantages of each method. Graphs, diagrams. 2 ref. (F general, G general)

47-F. (German.) **Investigations on the Lubricity of Cold Rolling Oils, Particularly of Oil Emulsions.** Joseph Billigmann. *Stahl und Eisen,* v. 75, no. 25, Dec. 15, 1955, p. 1691-1701; disc. 1701-1705.

Tests made on ten different emulsion oils as compared with palm oil, undiluted mineral oil and water. Effect of the addition of corrosion inhibitors, variations in the oil composition with different supplies, effect of different fatty acid contents of the emulsions, changes in the properties of the lubricants when rolling with higher speeds, stability of the emulsion oils. Graphs, micrographs, tables. 44 ref. (F1, F23)

48-F. (Polish.) **Mechanization of the Production of Drop-Forged Rings.** Wieslaw Wroblewski. *Wiadomosci hutnicze,* v. 11, no. 11, Nov. 1955, p. 342-347.

Soviet designs of mechanized anvils, hammers and presses for various forging techniques. Diagrams, photograph. 7 ref. (F22, ST)

49-F. (Russian.) **Examination of the Defects of Extruded Nonferrous Semi-Products.** Z. Hegedüs. *Acta Technica Academiae Scientiarum Hungaricae,* v. 13, nos. 1-2, 1955, p. 115-147.

Effects of inclusions and extruding variables on the quality of extruded shapes. Photographs, tables, micrographs. 17 ref. (F24)

50-F. (Slovak.) **Practical Experience in the Use of Plastic Bearings in Steel Rolling Mills.** Frantisek Nuhlicek. *Hutnik,* v. 5, no. 10, Oct. 1955, p. 299-302.

Effect of various types of lubricants with water cooling. Bearing materials and designs. Tables, diagrams. 2 ref. (F23, F1)

51-F. Newest Production Techniques at Chevrolet's Tonawanda Forge Plant. Thomas Mac New. *Automotive Industries,* v. 114, Jan. 15, 1956, p. 66-69.

Manufacturing processes and machines used in a modern forge shop. Diagrams, photographs. (F22, ST)

52-F. Extruding Metal With Glass Lubricants. J. Delcroix. *Metal Progress,* v. 69, Jan. 1956, p. 57-60.

A brief discussion of extruding metal with powdered glass, resulting in easier and faster working conditions, better surface on the extrusion, less power requirement, increased adaptability of the process. Photograph. 1 ref. (F1, F24)

53-F. Large-Section Aluminium Extrusions. *Overseas Engineer,* v. 29, Jan. 1956, p. 218-219.

Developments in aluminum alloy structural, marine and transport fields require larger sections in strong and medium-strength alloys. New British extrusion factory can produce wide range of aluminum sections. Photographs. (F24, T26, Al)

54-F. The Extrusion of Beryllium. E. C. Creutz, D. G. Gurinsky, J. H. Chapin, R. W. Yancey, F. G. Foote, H. Bethke and A. R. Kaufmann. *U. S. Atomic Energy Commission,* TID-5212, Sept. 1955, p. 49-66.

Extrusion into round or rectangular shapes, or into tubing is successful between 1500 and 1900° F. Resulting material has greater strength and ductility than cast metal. Diagrams, photographs, table. 11 ref. (F24, Be)

55-F. (French.) **Soaking Pits. Types of Furnaces, Operation and Maintenance, Recuperation and Control.** M. Courdille. *Centre de documentation sidérurgique, circulaire d'informations techniques,* v. 12, no. 11, 1955, p. 2161-2174.

Existing types of furnaces and recuperators. Operational peculiarities for special types of steels. Critical evaluation of different types of soaking pits. Table, diagrams. 4 ref. (F21, ST)

56-F. (French.) **The Forgeability of Steels.** G. Remy. *Centre de documentation sidérurgique, circulaire d'informations techniques,* v. 12, no. 12, 1955, p. 2413-2419.

Hot tension tests, at different speeds, on various carbon steels and influence of testing speed in forgeability tests, other than hot tension tests. Table. 13 ref. (F22, ST)

57-F. New Economy in Rolling Mill Bearings. R. G. Walmsley. *British Steelmaker,* v. 22, Jan. 1956, p. 10-17.

Production and use of laminated fabric bearings for abnormally rapid wear points in steel rolling mills. Advantages are economies in drive power, shut-down time, lubrication and bearing life. Photographs, table, diagrams, graphs. (F23, ST)

58-F. Moh i Rana. Norway's Promise of Self-Sufficiency. *British Steelmaker,* v. 22, Jan. 1956, p. 20-22, 24.

Rolling mill plant and equipment at the completely integrated plant built by Norwegian government as part of a long-range plan to be self-supporting in production of steel. Photographs. (F23, A5, ST)

59-F. Tube Straightening. *Iron and Steel,* v. 29, Jan. 1956, p. 26.

New high-speed machine developed for use in production of high-grade, hot finished steel tubes for oil pipe lines. Can handle very large diameter work. Photographs. (F29, ST)

60-F. Regular Rolled Sections. Z. Wusatowski and R. Wusatowski. *Iron & Steel,* v. 29, Jan. 1956, p. 27-32. (Condensed from *Metallurgie und Giessereitechnik,* v. 4, July 1954, p. 295.)

Mathematical treatment of the problem of accurate roll design, using constancy of volume as a basis for the calculations. Diagrams, tables, graphs. 6 ref. (F23, ST)

61-F. Designing Aluminum Forgings. A. E. Favre. *Machine Design,* v. 28, Jan. 26, 1956, p. 76-84.

Advances in process, press equipment and alloys discussed in relation to improvement in the tolerances available to the designer. Diagrams, graphs, photographs, tables. (F22, Al)

62-F. Induction Heating for Forging. D. Warburton Brown. *Mechanical World and Engineering Record,* v. 136, Jan. 1956, p. 32-34.

Provides an accurate control of the applied heat and of metallurgical conditions in automatic forging plants. Photographs. (F22, J2)

63-F. (English.) **Investigation of the Influence of Different Factors on Roll Pressure, Energy Consumption, Spread and Forward Slip in Hot Rolling.**

Gunnar Wallquist. *Jernkontorets annaler,* v. 139, no. 12, 1955, p. 923-1030.

Effects of composition, temperature and thickness on roll pressure power consumption, spread and slip for 16 steels studied in experimental mill. (F23, ST)

64-F. Studies in Cold-Drawing. III. Determination of Friction Coefficient. H. Majors, Jr. *ASME, Transactions,* v. 78, Jan. 1956, p. 79-85.

Average coefficients of drawing friction determined for forward and reversed drawing of 2S-O aluminum and SAE 1020 steel by Sachs' theory and compared with measurements using SR-4 wire strain gages on the outer die surface to determine die pressures. Tables, graphs, diagram. 21 ref. (F28, Q25, Al, CN)

65-F. Canadian Metals' Review of Metalworking Technology. *Canadian Metals,* v. 19, Jan. 1956 p.26 + 13 pages.

Assessment of up-to-date metalworking developments in iron and steel, nonferrous and special alloys, and techniques related to fabrication. (F general, G general, Fe, ST, Ni, Cu, Co, AY, Al)

66-F. Extrusion of Light-Alloy Sections. *Sheet Metal Industries,* v. 33, no. 345, Jan. 1956, p. 53-57.

Design and operation of new British extrusion plant with 5000 and 3000-ton piercing presses. Photographs. (F24, Al)

67-F. Resistance to Deformation During Hot Rolling. VIII. The Rolling of Metals and Alloys. *Sheet Metal Industries,* v. 33, no. 345, Jan. 1956, p. 59-64.

Method of calculating mean values of resistance to plane homogeneous deformation. Graphs, tables, diagram. 1 ref. (F23, Q24, Cu, CN)

68-F. Productivity Problems Solved by Equipment, Methods Analysis. Charles C. Tappero. *Western Metals,* v. 14, Jan. 1956, p. 54-57.

How detailed study of existing equipment and methods will help in selecting most efficient design and layout to provide maximum production at minimum cost. Examples of application of such studies to production in a wire mill. Photographs. (F28)

69-F. Magnesium and the Heavy Press Program. J. R. Douslin. Paper from "The User Speaks About Magnesium". Magnesium Association, 4 p.

Application and development of the heavy presses (up to and including 50 ton) on magnesium and aluminum from 1946, as related to the aviation industry. (F22, G1, Mg, Al, Ti)

70-F. Slitting and Shearing Steel—and Costs. *Finish,* v. 13, Feb. 1956, p. 20-21.

Operation of coil steel slitting and flying shear line which will save kitchen equipment manufacturer about $10 per ton of coil steel used. Photographs. (F29, ST)

71-F. Soaking-Pit Practice. R. H. Slade. *Iron and Steel Institute, Journal,* v. 182, Jan. 1956, p. 3-9.

Deals with results of 3½ years' experience of operating a battery of 20 bottom-fired Amsler-Morton soaking pits. Results show how modern advances in pit construction and instrumentation have permitted great improvements in soaking-pit heating, in regard to both fuel efficiency and steel quality. Tables, graph, diagrams, photographs. (F21, ST)

72-F. The Investigation of the Wire Drawing With Die Generated by Conical Section. Toshio Nishihara, Mutsuo Kakuzen and Hiroshi Nakamura. *Kyoto University, Engineering Research Institute Technical Reports,* v. 5, no. 4, Aug. 1955, p. 75-115.

Effects of drawing conditions on properties of the drawn wires from the standpoint of theory and experiment. Diagrams, graphs, tables. 4 ref. (F28)

73-F. The Modern Electric-Weld Steel Tube Mill. F. Spicer. *Metalworking Production,* v. 100, Jan. 13, 1956, p. 63-68.

A British cold roll forming and electric-weld tube mill described; includes roll design, resistance welder, welding operations, take-off section. Graph, diagrams, photographs, table. (F26, ST)

74-F. New Welding Process for Tubing. *Steel Processing,* v. 42, Jan. 1956, p. 20, 54.

Process developed to manufacture welded stainless steel and high alloy tubing and pipe. Rolls of the continuous mill were inverted and the formed tubing welded from the underside, thereby permitting gravity to eliminate the weld bead on the inside diameter of the tubing. Photograph. (F26, SS, AY)

75-F. Wire-Drawing Lubrication. . . Where Do We Go From Here? R. Tourret. *Wire Industry,* v. 23, Jan. 1956, p. 41-44, 56.

Problems in lubricating dies and research directed at prolonging life of dies and reducing power requirements. Photograph, graphs, diagram. 5 ref. (F28, F1)

76-F. (Czech.) **Effect of Wire Drawing Processes on Drawing. Ability and Mechanical Properties of Soft Steel Wires.** Oldrich Modracek. *Hutnické listy,* v. 10, no. 12, Dec. 1955, p. 715-720.

Changes in mechanical properties during the drawing of wires from soft carbon steels, produced by the openhearth process, are compared. Effect of the oxygen during refining and of storage time on properties of drawn wires determined. Tables, graphs. 2 ref. (F28, Q23, CN)

77-F. (Italian.) **Influence of Small Work Hardenings on the Mechanical and Technological Properties of Steel Strip.** L. Dainelli and L. Cocciolo. *Metallurgia Italiana,* v. 47, no. 11, Nov. 1955, p. 501-504.

Studies were made on soft, cold-rolled and annealed strip for purposes of improving surface appearance. Graphs. (F23, ST)

78-F. (Russian.) **Complex Automation of Blooming Mills.** A. G. Birfel'd, E. G. Gnilosyrov, O. V. Slezhanovskii and N. A. Tishchenko. *Elektrichestvo,* no. 12, Dec. 1955, p. 9-18.

Efficiency, speed and output, before and after modernization. Circuits and equipment for automatic regulation of blooming-mill components. Table, graphs, circuit diagrams, oscillogram. (F23)

79-F. Instrumentation of a 14-In. Experimental Rolling Mill. First Step —Measurement. S. S. Carlisle and G. W. Alderton. *British Steelmaker,* v. 22, Feb. 1956, p. 44-48.

Measurement of factors involved in establishing an automatic control system. Diagrams, photograph. (To be continued) (F23, S18, ST)

80-F. Five Ways to Stretch Wire Production. Charles C. Tappero. *Steel,* v. 138, Feb. 6, 1956, p. 126, 129, 132.

Speed and quality of production can be increased by improvement of old equipment, better maintenance programs and better division of workload. Photographs. (F28)

81-F. Colloidal Graphite as a Wiredrawing Lubricant. D. G. Weaver. *Wire and Wire Products,* v. 31, Feb. 1956, p. 184-185, 229-232.

Broad range of wiredrawing applications for colloidal graphite. Photographs, graphs. (F28, F1)

82-F. Wire Drawing Lubricants. Fritz Rabenhorst. *Wire and Wire Products,* v. 31, Feb. 1956, p. 196, 238-239.

Composition and applications of various dry, paste and wet lubricants. (F28, F1, Cu, Al)

83-F. Manufacture of Aluminum Conductor Telephone Cable. James S. Herbert. *Wire and Wire Products,* v. 31, Feb. 1956, p. 178-182, 240-242.

Copper manufacturing machinery was modified for aluminum. Summary of engineering, production and operating results. Diagrams, graphs, tables, photographs. (F28, T1, Al)

84-F. (Polish.) **Analysis of Formulas for the Coefficient of Mean Elongation of Rolled Iron Shapes.** Z. Wusatowski and K. Rytel. *Prace Instytutow Ministerstiwa Hutnictwa,* v. 7, nos. 5-6, Dec. 1955, p. 253-269.

Comparison of several formulas by mathematical analysis for the real coefficient of elongation. Tables, graphs, diagrams. 12 ref. (F23, Q24, Fe)

85-F. Production of Large-Diameter Welded Steel Pipes. *Engineering,* v. 181, Feb. 3, 1956, p. 122-124.

Equipment and operating procedures. Diagram, photographs. (F26, ST)

86-F. Abrasive Wheels Simplify Steel Billet Cutting. V. E. Lysaght. *Iron Age,* v. 177, Feb. 16, 1956, p. 99-101.

Modern abrasive cut-off machines as a universal cutting medium. Rubber-bonded wheels are used for the toughest alloys; worn wheels are shifted to smaller machines for economy. Photographs. (F29, AY)

87-F. Resistance Heating Boosts Forging Efficiency. *Iron Age,* v. 177, Feb. 16, 1956, p. 108-110.

Flanged rear-wheel axles for motor vehicles are being forged by a German firm with modern upsetting machines, friction forging presses, after parts are heated by electrical resistance method. Results are improved economy and accuracy, simplified handling, excellent structure. Photographs. (F22)

88-F. Modern Forging Presses and Their Control. R. M. L. Elkan and J. T. Lewis. *Iron and Steel Institute, Journal,* v. 182, Feb. 1956, p. 200-215.

Press construction, drives and hydraulic circuit design. Eccentric loading effects, friction, power and compressibility also considered. Tables, photographs, diagrams, graph. 9 ref. (F22)

89-F. The Manufacture of Steel Sheet and Strip. J. Lomas. *Machinery Lloyd (Overseas Ed.),* v. 28, Feb. 18, 1956, p. 81-84.

Processes, differences between hot and cold rolling, applications of each. (F23, ST)

90-F. Plate Levelling and Bending Machines. *Machinery Lloyd (Overseas Ed.)* v. 28, Feb. 4, 1956, p. 91-92.

Heavy duty five-roll plate levelling machine and a five-roll plate bending and straightening machine. Photographs. (F29, G6, ST)

91-F. Roll Force Measurement. R. B. Sims. *Metal Industry,* v. 88, Feb. 17, 1956, p. 125-128.

Describes load meters and tensionmeters and their application to mill equipment. Mentions the first industrial system of automatic gage control to be installed on a cold mill. Photographs, diagrams. 4 ref. (F23, S18)

92-F. Use of Heated Compressed Air in Forging Hammers. F. C. Evans. *Metal Treatment and Drop Forging,* v. 23 Feb. 1956 p. 49-54.

Economic advantages. Two designs of compressed air heaters suitable for industry and practical results of their applications. Diagrams, photograph. 3 ref. (F22)

93-F. Steel Controls Own Weld-Cycle. *Metalworking Production,* v. 100, (Combined Issue), Feb. 10 and 17, 1956, p. 228-230.

Barton tube-welding process gives improved quality and speed of production in pipe welding by permitting the plasticity of the steel being welded to control the weld cycle. Photographs, micrograph, diagram. (F26, ST)

94-F. The Rolling of Metals and Alloys. IX. Hot Rolling: Calculating the Roll-Separating Force. E. C. Larke. *Sheet Metal Industries,* v. 33, no. 346, Feb. 1956, p. 143-148.

Simple method for computing roll separating forces developed when slab and strip materials are hot rolled. Graphs, tables. 6 ref. (To be continued.) (F23, CN)

95-F. Tooling a Heavy Forging Press. Albert E. Favre. *Tool Engineer,* v. 36, Mar. 1956, p. 125-128.

Problems created by necessity for greater precision in forging, especially of aircraft parts. Photographs, diagrams. (F22)

96-F. On the Heterogeneities of Steel Forgings and the Resultant Mechanical Properties. Edward A. Loria. *Blast Furnace and Steel Plant,* v. 44, Mar. 1956, p. 315 + 6 p.

Ingot size and forging reduction, dendritic structure, banding and inclusions. Graphs, micrographs, diagram, table. 12 ref.
(F22, N12, Q general, ST)

97-F. The Development of New and Unique Manufacturing Techniques for the Production of Passenger-Car Frames. Godfrey Burrows. *Engineering Journal,* v. 3, Mar.-Apr. 1956, p. 2-11.

Problems presented by new manufacturing techniques used to produce 1955 Chevrolet passenger car frame side rails. Each separate operation, from tube mill to bending, required special planning, design, and experimental processing. Photographs, diagrams.
(F general, G general, T21)

98-F. Extrusion of Metals. G. A. Moudry. *Iron and Steel Engineer,* v. 33, Mar. 1956, p. 79-83.

Steel can be extruded at speeds much higher than aluminum, but at lower pressures. However, the extrusion temperature of steel is much higher about 2300° F., with far worse effects on the die blocks. Graphs, photographs. (F24, ST, Al)

99-F. (Czech.) **Laps in Rolled Material.** Zdenek Volf. *Hutnik,* v. 5, no. 11, Nov. 1955, p. 328-335.

Laps result from roll alignment and adjustment, improper heating, feed and other factors. Criteria for differentiating laps and seams from true cracks with similar surface appearance. Photographs, diagrams, micrographs. 7 ref. (F23, ST)

100-F. (English.) **4-High Reversing Cold Strip Mill and Its Electrical Equipment for Wide Steel Strips.** Hisao Kitsukawa, Hideyuki Yamamto, and Osamu Tazuke. *Hitachi Review,* 1955, no. 10, Oct. 1955, p. 3-14, 22.

Specifications for the rolling mill, problems involved in cold mill projects, data on electric drive equipment. Tables, photographs, diagrams, graphs. 17 ref. (F23, ST)

101-F. (French.) **Photographic Study of Rolling. Study of Deformation Between the Rolls of a Blooming Mill. Status of Research After the Photogrammetric Measurement Tests of December, 1954-January, 1955.** J. Stremsdoerfer. *Centre de Documentation Sidérurgique, Circulaire d'Informations Techniques,* v. 13, no. 1, 1956, p. 177-190.

Methods and equipment used in photogrammetric study of plastic deformation during rolling in a blooming mill. Diagrams, photographs, graphs. (F23, Q24, ST)

102-F. (French.) **The Forging of Hollow Pieces.** F. Guillemin. *Flamme et thermique,* v. 9, no. 88, Jan. 1956, p. 19-24, 33-42.

Treatment of pieces before forging, reheating, types of furnace, calamine, superheating of the steel, induction heating, surface improvement. Diagrams, photographs, graph. 13 ref. (F22, ST)

103-F. Improving Productivity in a Wire Mill. Charles C. Tappero. *American Iron and Steel Institute, Preprint,* 1955, 11 p.

Factors causing delays and suggested changes in equipment and handling methods to eliminate them; with special emphasis on helping operator to perform work faster and with less fatigue. Photographs. (F28)

104-F. (German.) **Method of Measuring the Wear in Wiredrawing With Drawing Dies Activated in the Atomic Pile.** Winfrid Dahl and Werner Lueg. *Stahl und Eisen,* v. 76, no. 5, Mar. 8, 1956, p. 257-261.

Testing methods, activation of the drawing dies, drawing tests, preparation of the solutions, measurement of the activity, autoradiographs. Example. Tables, diffractogram. 16 ref. (F28, Q9, S19)

105-F. (German.) **Forging and Drop-Pressing of Magnesium Alloys of Mg-Al-Zn Type.** Wilhelm Rosenkranz. *Zeitschrift für Metallkunde,* v. 47, no. 2, Feb. 1956, p. 107-117.

Influence of preliminary shaping temperature, working temperature and speed, and artificial aging on the properties of the forged and extruded alloys. Tables, graphs, diagrams, photographs. 1 ref. (F22, Q general, Mg, Al, Zn)

106-F. (German.) **Limits of Deformation in Extrusion Pressing.** Kurt Laue and Helmut Hornauer. *Zeitschrift für Metallkunde,* v. 47, no. 2, Feb. 1956, p. 117-121.

Factors which influence the process of deformation during impact extruding, giving a basis for calculating the most favorable conditions for deformation. Graphs, tables, diagrams. 4 ref. (F24, Al)

107-F. (Japanese.) **On the Λ Segregated Zone of Large Carbon Steel Ingots. III. Segregation Flaws Appearing in Large Carbon Steel Forgings.** Masayoshi Kawai. *Iron & Steel Institute of Japan, Journal,* v. 42, no. 2, Feb. 1956, p. 85-93.

Formation of flaws, relation between formation and manufacturing conditions. Micrographs, photographs. (F22, D9, CN)

108-F. (Japanese.) **Residual Stress in Cold Drawn Steel Tubings. II.** Hiroshi Imai. *Iron & Steel Institute of Japan, Journal,* v. 42, no. 2, Feb. 1956, p. 99-105.

Effects of die contour and reduction ratio on residual stresses. Diagrams, tables, graphs. 3 ref. (F26, Q25, ST)

109-F. Forging Alloys for High-Temperature Service. *Metal Industry,* v. 88, Mar. 23, 1956, p. 225-226.

Investigations of alloys suitable for high-temperature service in jet engines. Tables. (F22, T25, SG-h)

110-F. How to Improve Structural Homogeneity of Hot-Rolled (Strip) Steel. V. A. Shadrin, M. A. Benyakovskii and S. G. Guterman. *Henry Brutcher Translation No.* 3599, 8 p. (From *Stal,* vol. 15, no. 1, 1955, p. 86-88.) Henry Brutcher, Altadena, Calif.

Ways of preventing the occurrence of coarse precipitate in three hot-rolled strip steels, based on hot rolling trials, various cooling rates and micro-examination. Table, graph, micrographs. (F23, ST)

111-F. Textures of Rolled and Recrystallized Titanium. N. V. Ageev and A. A. Babareko. *Henry Brutcher Translation No.* 3635, 9 p. (From *Izvestiya Akademii Nauk SSSR, OTN,* no. 8, Aug. 1955, p. 100-106.) Henry Brutcher, Altadena, Calif.

Effect of rolling temperatures and amount of reduction in rolling upon the degree of perfection of the texture of iodide, magnesium-thermit and hydride titanium. Effect of recrystallization after reduction. X-ray diffraction patterns, diagrams. 12 ref. (F23, N5, Ti)

112-F. Performance of Various Emulsions in the Cold Rolling of Strip Steel. H. Pannek. *Henry Brutcher Translation No.* 3639, 13 p. (Abridged from *Stahl und Eisen,* v. 75, no. 12, 1955, p. 767-769.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 163-F, 1955. (F23, ST)

113-F. (Czech.) **Experimental Rolling of Transformer Bands for High-Tension-Current Electrotechnics.** Rudolf Pulpan. *Hutnické Listy,* v. 11, no. 3, Mar. 1956, p. 132-134.

Production of anisotropic silicon steel bands 260 mm. wide, including melting, production of slab blooms, and hot and cold rolling. Table. 1 ref (F23, D9, SG-p)

114-F. Scale-Free Heating of Steel at 2200° F. W. Trinks. *Industrial Heating,* v. 23, Apr. 1956, p. 718 + 4 pages.

Investigation of the known methods of heating steel to rolling and forging temperatures; discussion of their practicability. Diagrams, (F21, ST)

115-F. The Hot Forming of Magnesium Alloys. R. G. Wilkinson. *Institute of Metals, Journal,* v. 84, Mar. 1956, p. 217-228.

Compositions and mechanical properties of the principal wrought alloys; data on the effects of heating on the properties, special requirements in equipment, procedures for hot-forming sheet and extrusions. Diagrams, graphs, tables. 8 ref. (F general, Q general, Mg)

116-F. Ultimate Capacity of a Slabbing Mill. H. G. Jones, D. T. Steer and P. D. Dickerson. *Operational Research Quarterly,* v. 7, Mar. 1956, p. 1-11.

Problems in estimating ceiling capacity of the unit which controls the total output in a particular steelworks. Graphs, tables. (F23, ST)

117-F. Fabrication of Titanium Prototypes of 81-MM. Mortar Base Plate. R. W. Huber. *U. S. Bureau of Mines, Report of Investigations* 5179, Mar. 1956, 32 p.

Successful development of a titanium prototype; information dealing with forming, forging and machining, welding and assembly techniques; design changes relative to this prototype. Photographs, table. 3 ref.
(F general, G general, K general, Ti)

118-F. The Rolling of Metals and Alloys. IX. Hot Rolling: Calculating the Roll-Separating Force. E. C. Larke. *Sheet Metal Industries,* v. 33, no. 347, Mar. 1956, p. 209-213.

Comparison between calculated and measured loads. Loads were calculated for 71 different hot rolling conditions. Graphs, table. 1 ref. (To be continued.) (F23)

119-F. (German.) **Fine Forging and Forging Equipment.** K. W. Michler. *Metall,* v. 10, no. 7-8, Apr. 1956, p. 293-297.

Machines, methods, applications, advantages. Diagrams, photographs. (F22)

120-F. (German.) **Present State of the Scientific Knowledge in Hot Shaping and Forging.** Erich Siebel. *Stahl und Eisen,* v. 76, no. 7, Apr. 5, 1956, p. 393-397.

Relations between the resistance to deformation and the stresses. Law of constancy of volume; law of flow. Deformation losses. Flow curves of various materials. Relations between rate of deformation and resistance to deformation. Process of upsetting and press forging. Tables, graphs, diagrams. 4 ref. (F22)

121-F. (Spanish.) **Development of the Process for Conditioning Steel Surfaces. I-II.** H. R. Pufahl. *Fusion de Metales,* v. 18, no. 1, Jan.-Feb. 1956, p. 17-28; Mar.-Apr. 1956, no. 2, p. 16-28.

Use of new types of torches for scarfing and automatic machines for conditioning the surfaces of billets, ingots and plate. Types of surface defects (seams, scabs and laps), methods and equipment to correct them. Photographs, tables. (F21, ST)

122-F. The Production of Extruded Steel Sections. *Machinery (London)* v. 88, Apr. 20, 1956, p. 478-490.

Application of the Ugine-Sejournet process and use of a new type of Italian billet-heating furnace. Diagrams, table, photographs. (F24, ST)

123-F. Production of Compressor and Gas Turbine Blades. A. T. Colwell. *Machinery (London)* v. 88, Apr. 20, 1956, p. 503-506.

Precision forging and powder metallurgy methods. Photographs. (F22, H general)

124-F. The Predetermination of Tensile Strengths in Steel Wire Manufacture. II. C. Coates. *Wire Industry,* v. 23, Apr. 1956, p. 319-320.

Possible causes of tensile variation. Includes effect of heat treatment, variation of carbon content, air patenting and drawing speeds. (F28, Q27, ST)

125-F. (French.) **Aluminium Alloy Forged Pieces and Sections. VII. Study Elements.** Robert Colomb. *Revue de l'Aluminium,* v. 33, no. 229, Feb. 1956, p. 162-167.

Forging control operations, size and quantity tolerances, methods of detecting defects, protection against corrosion. Tables, micrographs, diagram. (F22, R general, Al)

126-F. (Book.) **Forging and Welding.** Robert E. Smith. 160 p. 1956. McKnight & McKnight Publishing Co., Market & Center Sts., Bloomington, Ill.

Safety precautions, forging equipment and procedures, oxy-acetylene, gas-arc and electric-arc welding. (F22, K1, K2)

127-F. Delayed Cracking of Rolled Ti-150A. Harold Bernstein, *Metal Progress,* v. 69, May 1956, p. 65-67.

Centerline cracking of warm rolled Ti-150A which occurs after the alloy has cooled to room temperature can be eliminated by a stress-relieving treatment or by proper edge preparation. Photograph. (F23, J1, Ti)

128-F. Forging Dies and Tools. Factors Affecting Design. A. Hughes and D. Vallance. *Metal Treatment*

and Drop Forging, v. 23, Apr. 1956, p. 135-143.

Various dies and tools for the forging industry, indicating the importance of design and factors affecting it. Diagrams, photographs. (F22)

129-F. Finished-Forged Gear Teeth Now Used in German Autos. O. Rieckhoff. *Product Engineering*, v. 27, May 1956, p. 180-183.

By a new process developed in Germany, gear teeth are forged to sufficient accuracy to require no machining. Applications include differentials for all types of motor vehicles and other uses where speeds are relatively low. Materials used, accuracy and costs. Diagrams, graphs, photographs, table. (F22)

130-F. (Russian.) **For Speedier Introduction of Economical Profiles in Rolled Iron.** B. S. Shapiro. *Metallurg*, no. 1, Jan. 1956, p. 12-15.

Discusses replacing some of the presently used rolled shapes with more economical lighter profiles. Examples of revised shapes saving labor and material in some cases up to 17%. A special group of bent rolled profiles described. Diagrams, table. (F23)

131-F. (Russian.) **Use of Roller Guides in Section Mills.** N. V. Litovchenko. *Metallurg*, no. 2, Feb. 1956, p. 12-15.

Advantages of roller-type entrance and delivery guides in section mills. Rollers reduce friction and wear; at the delivery end, torsion of the processed piece about the longitudinal axis is prevented. Diagrams. (F23)

132-F. (Russian.) **Cold Rolling of Stainless Pipes Without Cooling.** S. S. Shaikevich, N. L. Oslon, P. K. Stasevich and A. G. Leveinem. *Stal*, v. 16, no. 4, Apr. 1956, p. 337-342.

Cold rolling of stainless steel tubes not over 48 mm. in diam. can be successfully done without cooling if the rollers do not become heated above their temperature of annealing. Durability of the rollers increases three times, and the over-all efficiency of rolling 21%. Tables, diagrams, photographs. 6 ref. (F26, SS)

133-F. (Russian.) **The Effect of Slight Cold Finishing on the Structure and Magnetic Properties of Hot-Rolled Transformer Steel.** B. F. Trakhtenberg. *Stal*, v. 16, no. 4, Apr. 1956, p. 343-347.

Application of cold finishing (4 to 8% reduction) to hot rolled transformer steel results in a decrease of total specific losses by approximately 0.2 to 0.3 watts per kg. Simultaneously, magnetic induction in strong fields is reduced by 1-3% due to changes in the grain size. Diagram, graphs, micrographs, tables. 11 ref. (F23, P15, P16, AY)

134-F. Intricate Ti Parts Now Forged in Presses. John P. Wright and Arnold L. Rustay. *American Machinist*, v. 100, May 21, 1956, p. 113-117.

Data on new methods for forging parts having intricate contours, larger in size and calling for critical specifications on mechanical properties; design recommendations and case studies. Micrograph, diagrams, photographs, graphs. (F22, Ti)

135-F. For Foolproof Lubrication, Spray Your Extrusion Dies. Donald R. Acklin. *Modern Metals*, v. 12, May 1956, p. 40-41.

New method boosts die life, slashes scrap rate, improves finish, eliminates injuries and reduces lubricant consumption by 50%. Photographs. (F24, F1)

136-F. The Rolling of Metals and Alloys. X. The Energy Consumed and the Horsepower Developed During Cold Rolling. E. C. Larke. *Sheet Metal Industries*, v. 33, no. 348, Apr. 1956, p. 259-264.

Approximate methods of calculating energy requirements associated with rolling are illustrated. Tables, diagrams. 1 ref. (To be continued.) (F23)

137-F. Progress Through Research. Bruce W. Gonser. *Wire and Wire Products*, v. 31, May 1956, p. 539-540, 597.

Shows the way to better metals and more economical production through research on such problems as uniformity of stock, back tension, process simplification, fatigue and stress relief. Photographs. (F28)

138-F. The Predetermination of Tensile Strengths in Steel Wire Manufacture. C. Coates. *Wire and Wire Products*, v. 31, May 1956, p. 549-553, 596.

By control of physical properties and metallurgical treatment, a scheme is proposed for prediction of tensile strength. Tables, graphs, diagram. (F28, Q27, CN)

139-F. Wire Flattening. A. Ball. *Wire Industry*, v. 23, May 1956, p. 423 + 6 pages.

Some experiences and problems associated with the cold forming of

wire into flat sections. Graph, tables, diagram. (F28)

140-F. (French.) **Recent Installations Set Up by the SECIM.** M. Goué. *Centre de Documentation Siderurgigue, Circulaire d'Information Techniques,* v. 13, no. 4, 1956, p. 745-764.

Construction of a rolling mill and a wire-drawing table for special steels. Describes construction of steel plants at Paz del Rio, Colombia and Chimbote, Peru. Photographs. (F23, F28, A5, ST)

141-F. (French.) **Flattening of Sheets by Machine.** Pierre Lepeu. *Revue de l'Aluminium,* v. 33, no. 230, Mar. 1956, p. 291-295.

Causes of non-flatness, ways of flattening. Diagrams, photographs. (F29)

142-F. (Swedish.) **The Size of the Mill Spring in Hot Rolling.** Gunnar Wallquist and Kurt Gedin. *Jernkontorets Annaler,* v. 140, no. 3, 1956, p. 155-188.

Results from a study of 11 stands. The spring in a mill is broken down into three components: total, specific and spring coefficient. Tables, graphs, diagrams. (F23)

143-F. A Graphical Solution of the Cold-Rolling Problem, When Tensions are Applied to the Strip. G. Lianis and Hugh Ford. *Institute of Metals, Journal,* v. 84, Apr. 1956, p. 299-305.

Nomographs cover the practical range of cold rolling conditions with a high degree of accuracy. Tables, graph, nomographs. 12 ref. (F23)

144-F. Comparison of an Unsymmetric Slip-Line Solution in Extrusion With Experiment. T. F. Jordan and E. G. Thomsen. *Journal of the Mechanics and Physics of Solids,* v. 4, May 1956, p. 184-190 + 2 plates.

Experimentally determined velocity vectors obtained from the extrusion of tubes of commercially pure lead from solid billets under axial symmetry and plane strain compared with an unsymmetric slip-line solution. Photographs, diagrams. 6 ref. (F24, Q24, Pb)

145-F. Extrusion Through Square Dies of Large Reduction. W. Johnson. *Journal of the Mechanics and Physics of Solids,* v. 4, May 1956, p. 191-198.

Slip-line fields for square dies of large reduction; results and expressions for calculating the extrusion pressure for extreme values of friction. Table, graphs, diagrams. 4 ref. (F24)

146-F. Hot Brass Pressing. Application of the Cored Forging Process. M. G. Cockcroft. *Metal Treatment and Drop Forging,* v. 23, May 1956, p. 171-178.

Fundamental ideas relating to forging operations in general; open and closed die pressing; procedures, applications and limitations of the cored forging process. Diagrams, photographs. (F22, Cu)

147-F. Fastest Cold Tandem Mill in Europe. *Sheet Metal Industries,* v. 33, no. 349, May 1956, p. 307-310.

Principal design features, roll changing, roll screwdown, coil feeding, interstand equipment, strip coiling, automatic roll cooling and lubrication, air conditioning, and future developments. Photographs. (F23)

148-F. The Rolling of Metals and Alloys. X. The Energy Consumed and the Horse-Power Developed During Cold Rolling. *Sheet Metal Industries,* v. 33, no. 349, May 1956, p. 337-342.

Roll-neck bearings, application of horsepower and energy formulas, effect of coiler and decoiler tension on energy and power. Graphs, tables. (To be continued.) (F23)

149-F. Tooling Heavy Extrusion Presses. Haskell J. Ross. *Tool Engineer,* v. 36, June 1956, p. 114-116.

Design and use of dies and other tools for heavy-press extrusion of aluminum. Photographs, diagrams, tables. (F24, Al)

150-F. (German.) **Influences Upon the Accuracy of Rolling During Hot-Rolling of Sheets and Strips and Their Control by Means of Experiment and Calculation.** O. Emicke and K. H. Lucas. *Neue Hütte,* v. 1, no. 5, Mar. 1956, p. 257-274.

Measurement of the elastic deflection of one special chill roll and two alloyed cast steel rolls on a 1000-ton press under various conditions. Calculation of elastic deformation of rolling stands and their component parts and effects of these influences on thickness differences of rolled plate. Graph, tables, diagrams. 12 ref. (F23, T5, CI)

151-F. (Italian.) **Sheet Rolling Operations.** Giacomo Agnelli. *Tecnica italiana,* v. 21, no. 2, Mar. 1956, p. 109-116.

Procedure of mechanical rolling, rolling potential and stress, strechings of fibers, rolling equipment. Diagrams, graph, table, photographs. (F23)

152-F. Principles of a Metallurgically and Physically Balanced Hot Strip Mill. M. Alexander Leishman. *Blast Furnace and Steel Plant,* v. 44, June 1956, p. 619-625.

Equipment, relationships enabling calculation of optimum coil lengths and weights, nomogram for rapid estimation of optimum coil lengths and weights for any combination of rolling conditions. Graphs, tables. (F23)

153-F. Promotion of Fluid Lubrication in Wire Drawing. D. G. Christopherson and H. Naylor. *Institution of Mechanical Engineers, Proceedings,* v. 169, no. 35, 1955, p. 643-653; disc., p. 666-678.

Die wear can be reduced by supplying oil to the entry at a pressure comparable with the yield stress of the wire. Pressure can be generated by causing the wire to approach the die through a tube of slightly larger diameter than the wire sealed on to the inlet side of the die. Photographs, diagrams micrographs, tables, graphs. 8 ref. (F28, F1)

154-F. Investigation of the Mechanics of Wire Drawing. J. G. Wistreich. *Institution of Mechanical Engineers, Proceedings,* v. 169, no. 35, 1955, p. 654-665; disc., p.666-678.

Round wire was drawn slowly and without backpull through dies with bores in the shape of truncated cones in a study of relations between external forces and process parameters. Photograph, diagrams, tables, graphs, micrographs. 18 ref. (F28)

155-F. History of the Fontana Blooming Mill. Reynold MacDonald. *Iron and Steel Engineer,* v. 33, May 1956, p. 94-97.

Modification and additions necessitated by conversion to peacetime steelmaking operation. Photographs. (F23, ST)

156-F. Computation of Roll Force and Torque in Cold-Rolling by Modern Theory. P. W. Whitton. *Journal of Applied Mechanics,* v. 23, June 1956, p. 307-311.

A combination of current theory on strip elastic compression, yield-stress curves in cold-rolling and friction coefficient between rolls and strip. Table, graphs, diagram. 11 ref. (F23)

157-F. (German.) **Predetermination of Deformation Forces in the Extrusion of Light Metal Sections.** H. Hornauer. *Aluminium,* v. 36, no. 6, June 1956, p. 350-356.

Processes involved in extrusion are analyzed and expressed in equations. Considerable attention is paid to resistance to change of shape and rate of deformation. Diagrams, photographs, nomograph. 14 ref. (F24, Al)

158-F. (German.) **Electrically Heated Pit Furnaces.** Hans Langenbach. *Stahl und Eisen,* v. 76, no. 10, Mar. 19, 1956, p. 614-618.

Arrangement of the heating channel and ingot rows. Floor space required, power consumption, operation, control of atmosphere, scaling loss. Photographs, diagrams, graph. 1 ref. (F21)

159-F. Effect of Modernization on Efficiency. Denis McQueen Potter. *Iron & Steel,* v. 29, June 1956, p. 303-308.

A case history, with discussion of melting shop, soakers, mills, traffic and rolling stock, wharf facilities, balance in operations, output per employee and fuel efficiency. (F23, ST)

160-F. The Importance and Growing Reality of Aluminium-Alloy Forgings in Industry. A. W. Willis. *Light Metals,* v. 19, June 1956, p. 174-176.

Selection of forging alloys, design of forged components, cost of tooling, surface finish and civilian applications. (F22, T general, Al)

161-F. Slitting Aluminum Coiled Stock. Carl S. Vogel. *Modern Metals,* v. 12, June 1956, p. 40, 42, 44, 46.

In fabricating practices coil can effect economies over flat sheet. The pros and cons of slitting lines and technical factors involved. (F29, A4, Al)

162-F. The Rolling of Metals and Alloys. XI. E. C. Larke. *Sheet Metal Industries,* v. 33, no. 350, June 1956, p. 411-417.

Corrected methods for calculating energy requirements involved in hot rolling slab and strip materials. (To be continued.) (F23)

163-F. Holes Forged In. *Steel,* v. 139, July 2, 1956, p. 67-70.

In cored forgings the holes are forged at right angles to each other in a one-shot process. Forgeability, uses and performance considered. (F22)

164-F. Basic Forging Concepts. I. Equipment and Part Design. Lester F. Spencer. *Steel Processing,* v. 42, June 1956, p. 319-326, 350-351.

Basic forging tools, forging draft angles, die closure, flash extension, warpage. (F22)

165-F. Integrated Plant Stretches West's Extrusion Output. *Western Metals,* v. 6, June 1956, p. 55-57.

Production of aluminum casement windows. (F24, T10, Al)

166-F. (German.) **Analysis of Flattening Phenomena During Groove Rolling.** *Neue Hütte,* v. 1, no. 6, May 1956, p. 353-362.

Derivation of new formulae; adaptation of formulae for groove rolling of bars; determination of the quantity of metal extended and flattened during the rolling process. Tables, photograph, diagrams. 10 ref. (F23, F29)

167-F. (Polish.) **Rolling and Drawing of Alloy ZnAl 1.** Kazimierz Janas. *Wiadomosci hutnicze,* v. 12, no. 4, Apr. 1956, p. 111-115.

Rolling temperature, thermal conductivity and other parameters affecting plastic working of copper, aluminum and this alloy. Wire drawing conditions. Comparison of mechanical properties of wire strength with copper or aluminum wire. (F23, F28, Q23, P11, Cu, Zn, Al)

168-F. (Swedish.) **Conditioning of Steel Ingots and Billets.** Gösta Kihlgren. *Jernkontorets Annaler,* v. 140, no. 4, 1956, p. 314-344.

Different machines for grinding, turning, planing and milling. Economic and technical aspects. (F21, A4, ST)

169-F. Basic Formulas for Roll Design and Rolling of Alloy Steels. A. M. Cameron. *Iron and Steel Engineer,* v. 33, June 1956, p. 55-74; disc., p. 74.

Empirical data on roll designs for standard sections such as rounds, squares, flats, hexagons and octagons. (F23, AY)

170-F. Induction Heating in Tubemaking. S. O. Evans. *Iron and Steel Engineer,* v. 33, June 1956, p. 75-79; disc., p. 79.

Application of induction heat must usually be based on some special advantages of the process to compensate for the higher cost per unit of energy. Some possible advantages are scale-free heating, flexibility, ease of shutdown, ability to handle small heats of steel, and ability to heat with marked difference in temperature zones. (F26, J2, ST)

171-F. Modernization of Blooming and Slabbing Mills at Sparrows Point Plant. P. E. Appel, M. Whitmore, H. W. Dorset and H. C. Henschen. *Iron and Steel Engineer,* v. 33, June 1956, p. 80-93; disc., p. 86, 93.

Engineering, mechanical and electrical features; soaking pit improvements. Conversion from 46 to 54 in. mill. (F23)

172-F. On the Calculation of Wire Drawing Force. I. The Case of Conventional Wire Drawing With Work Hardening. II. The Case of Wire Drawing With Back Tension. Kenichi Nakamura, Hiroo Takahashi and Juzo Kurihara. *Journal of Mechanical Laboratory (Japan),* v. 1, 1955, p. 26-28.

A formula of drawing force in wiredrawing through a conical die is derived and then converted to a formula for drawing force with back tension. (F28)

173-F. Now, Tool Steel Extrusions. *Steel,* v. 139, July 9, 1956, p. 92.

Molten glass is used as lubricant in Ugine-Sejournet extrusion process which produces shapes too intricate to roll. (F24, T6, TS)

174-F. (Czech.) **How to Roll Thin Sheet Steel.** Maxmilian Honzik. *Hutnik,* v. 6, no. 1, Jan. 1956, p. 12-14.

Comparison of advantages and disadvantages of two methods of cold rolling. Camparative economy and manufacturing planning. (F23, ST)

175-F. (Czech.) **Forging of Large Forgings.** Vilém Burda. *Hutnik,* v. 6, no. 2, Feb. 1956, p. 44-49.

Present state of techniques of forging large machine parts and measures for avoiding cracking. Proper techniques and hydraulic dies cut down amount of machining required afterwards. (F22, CN-m)

176-F. (French.) **Some Rolling Factors That Influence the Production of Heavy Sheets.** M. Hoffmann. *Centre de Documentation Sidérurgique, Circulaire d'Informations Techniques,* v. 16, no. 5, 1956, p. 957-964.

Studies the influence of rolling temperature, billet size and the shape of ends of the sheets on production capacity. (F23)

177-F. New Rod Mill Rated at Annual Output of 450,000 Tons. *Blast Furnace and Steel Plant,* v. 44, July 1956, p. 737-739, 746.

Mill consists of 25 roll stands, simultaneously produces four lines of rods at more than mile-a-minute speeds, and can roll all sizes of rods from 0.218 in. up to 1½ in. in dia. (F27, ST)

178-F. (Czech.) **The Manufacture of Welded Pipe.** Adolf Bijok. *Hutnik,* v. 6, no. 5, May 1956, p. 135-137.

With welded pipe replacing seamless rolled pipe, various welding methods are applicable. Speed of resistance welding is increased by using currents of higher frequencies. Inductive welding of thin-walled pipe and some of its problems are cited. (F26, K3, K6)

179-F. (Polish.) **Analysis of the Phenomena at Any Point Between the**

Rolls With the Occurrence of Spread. Zygmunt Wusatowski. *Archiwum Hutnictwa,* v. 1, no. 2, 1956, p. 141-169.

Formulae derived for determining the coefficient of spreading during the hot rolling of steel make it possible to accurately determine the way the metal flows during spreading. (F23, ST)

180-F. (Russian.) **Use of Phosphate Coating in Cold Drawing of Tubing.** M. A. Freiberg. *Metallurg,* no. 6, June 1956, p. 31-34.

Advantage of phosphate over copper coating as an aid in drawing steel tubing. (F26, F1, ST)

181-F. Computer Control of a Rolling Mill Schedule. A. H. Kuhnel. *Instruments and Automation,* v. 29, July 1956, p. 1303-1305.

A special-purpose computer applied to rolling mill operation. (F23, S18, ST)

182-F. High Purity Titanium Wire. *Modern Metals,* v. 12, July 1956, p. 72.

Employing the consumable electrode arc melting process in vacuum, new producer makes ductile wire for welding uses and product applications. (F28, C25, Ti)

183-F. The Rolling of Metals and Alloys. XII. The Productive Capacity of Strip Mills. E. C. Larke. *Sheet Metal Industries,* v. 33, no. 351, July 1956, p. 495-500.

Influence of certain factors on the productive capacity. A method of computing the effective tonnage rolled per hour and the time needed to complete a rolling schedule. (F23, A5)

184-F. Basic Forging Concepts. II. Forging Materials. Lester F. Spencer. *Steel Processing,* v. 42, July 1956, p. 387-392, 418.

Resume of the characteristics of the more important alloys suitable for forging. (F22, Mg, Cu, Al, CN, AY)

185-F. AS&W Places New Rod Mill in Operation at Its Cuyahoga Works. *Wire and Wire Products,* v. 31, July 1956, p. 765-766, 810-811.

This new Morgan mill has a capacity 25% greater than the two old mills it replaces. (F23)

186-F. (Czech.) **Formation of Flakes in Forged Pieces During Cooling and Their Removal.** Rudolf Hrivnak. *Hutnik,* v. 6, no. 3, Mar. 1956, p. 71-76.

Effect of cooling methods on formation of flakes. Heating of forged piece between preforming and other forging stages to eliminate flaky structure. Cooling, interforging heating and forging forces in relation to microstructure and forging ratio. (F22, M27, F21, ST)

187-F. (Polish.) **Mechanization of Forging Operations.** Edward Decowski. *Wiadomosci Hutnicze,* v. 12, no. 5, May 1956, p. 147-151.

Machines and methods for mechanizing cutting, loading, lifting, transporting and removing of forged or pressed pieces from the forging, stamping or pressing machines. (F22, F29, G3, A5)

188-F. New Sendzimir Mill Rolls Extra-Wide Sheet. *Iron Age,* v. 178, Aug. 2, 1956, p. 92-93.

King-sized mill rolls stainless grades in widths up to 50 in., holding thickness tolerances to ± 3%. (F23, SS)

189-F. Modernizing the Hot and Cold Strip Mills at Bethlehem's Lackawanna Plant. F. S. Eckhardt. *Iron and Steel Engineer,* v. 33, July 1956, p. 55-63; disc., p. 63-65.

Some details of a 20-yr. modernization program which increased hot mill capacity over four times and cold mill capacity almost eight times. (F23, ST)

190-F. Heating Heavy Sections—How Fast? Quentin M. Bloom. *Iron and Steel Engineer,* v. 33, July 1956, p. 66-74; disc., p. 74-77.

Some recent applications of high-speed heating of heavy sections illustrate the merits of high-speed furnaces as a steelmaker's tool. (F21, J general, ST)

191-F. Replacement of Inland's No. 2 Blooming Mill. A. L. Schroeder. *Iron and Steel Engineer,* v. 33, July 1956, p. 130-136.

Through careful planning and scheduling, the mill was rebuilt with total down time of 23 days and 45 min., with excellent production obtained in a very short time. (F23, ST)

192-F. Principles of a Metallurgically and Physically Balanced Hot Strip Mill. M. Alexander Leishman. *Iron and Steel Engineer,* v. 33, July 1956, p. 144-148.

Relationships were derived which enable optimum coil lengths and weights to be calculated for metallurgically balanced operations. (F23, ST)

193-F. Copper Tube Production. Federico Hruska. *Metal Industry,* v. 89, July 13, 1956, p. 23-26, 32.

Operation of a modern Chilean tube mill. (F26, Cu)

194-F. Rapid Heating of Small Forgings. J. E. Russell. *Metal Treatment and Drop Forging,* v. 23, July 1956, p. 251-256.

Advantages of efficient heating include lower fuel consumption, shorter furnace times and reduced scaling and decarburization. (F21, F22, ST)

195-F. (Polish.) **The Longitudinal Fluidity of Metal in the Deformation Zone.** Waclaw Leskiewicz. *Hutnik,* v. 23, no. 5, May 1956, p. 202-207.

Behavior of metal while going through the rolls. Review of previous work on the subject. Graphs of relationships of forward flow and temperature. Pressure distribution and forward flow. Formula expressing relation between forward flow and spread. (F23, Q24)

196-F. (Polish.) **The Calculation of Temperature Drop in Various Rolling Passes.** Edward Decowski. *Hutnik,* v. 23, no. 5, May, 1956, p. 216-219.

Formulas for calculating heat losses in the rolling process include the following factors; heat loss due to heat radiation, convection currents and the difference in temperature between rolls and hot metal, and heat produced during deformation of the metal in the rolls. (F23)

197-F. Progress in Strip. *British Steelmaker,* v. 22, Aug. 1956, p. 235-239.

Details of an expansion program for three British steel plants. (F23, ST)

198-F. Deformability of Transformer Sheet in Cold Rolling. G. N. Shubin, V. A. Shadran, and N. I. Lapkin. *Henry Brutcher, Translation No.* 3627, 5 p. (From *Fizika Metallov i Metallovedenie,* v. 1, no. 1, 1955, p. 180-184.) Henry Brutcher, Altadena, Calif.

Plastic properties data are vital for good rolling. Effects of variables in cold rolling. (F23, Q24, AY)

199-F. Thermal and Mechanical Service Conditions of Hot Extrusion Tools. K. Laue. *Henry Brutcher, Translation No.* 3748, 12 p. (Abridged from *Zeitschrift Metallkunde,* v. 46, no. 1, 1955, p. 1-6.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 72-F, 1955. (F24)

200-F. Russians Hot Roll Gears on Production Mill. A. J. Steiger. *Iron Age,* v. 178, Aug. 23, 1956, p. 104-106.

Gears of many types are rolled hot on a production mill. Spur gears are made by hot-rolling teeth in long billets, then slicing off individual gears. (F23)

201-F. Practical Approach to Coil Splicing. R. E. Morton. *Iron and Steel Engineer,* v. 33, Aug. 1956, p. 118-123; disc., p. 123-124.

Successful continuous production processes depend on successful splicing of smaller units. Welds should be sound and ductile to avoid later breakdowns; time element for welding must be short to maintain line speed and minimize work storage and holding problems. (F23, K1)

202-F. Tonnage Heating by Induction. Michael C. D. Hobbs and R. S. Segsworth. *Iron and Steel Engineer,* v. 33, Aug. 1956, p. 125-131; disc., p. 131.

Induction heating has important applications in tonnage production. It offers solutions to problems which involve mechanization, space and working conditions. In many cases adoption can be justified on costs alone. (F21)

203-F. (Czech.) **Comments on Flame Straightening.** *Strojirenska Vyroba,* v. 4, no. 6, June 1956, p. 238-244.

Advantages of the method include rapid, localized heating to a certain temperature, the degree depending on the size and type of the deformation. Effect of heating on properties of the metal straightened. Factors to consider in using the method. (F29)

204-F. (German.) **Effect of Impurities on the Rollability and the Properties of Zinc.** E. Pelzel. *Metall,* v. 10, no. 15-16, Aug. 1956, p. 697-700.

Effects of small tin contents on high-purity zinc and zinc with 1% lead or 1% lead and 0.03% cadmium. (F23, Q23, Zn)

205-F. (German.) **Inquiries Into the Forgeability of Difficultly Workable Steels.** Georg Juretzek and Rudolf Kuhn. *Neue Hütte,* v. 1, no. 7, July 1956, p. 390-399.

Influence of variables. Tests for determination of forgeability. The reheating of high speed steel and its influence upon surface defects. (F22, TS, AY)

206-F. Experiments in Plane-Strain Extrusion. W. Johnson. *Journal of the Mechanics and Physics of Solids,* v. 4, Aug. 1956, p. 269-282.

Extrusion experiments of lead and aluminum with several semi-angle dies at various reductions. Resulting values were compared with those predicted by slip-line field methods. (F24, Pb, Al)

207-F. Precision Forgings Reduce Machining Costs. L. M. Christensen. *SAE Journal,* v. 64, Aug. 1956, p. 34-38.

Comparison of identical piece-assembled structures and single-

piece forgings show that the forgings are lighter weight, structurally stronger, require less time to manufacture and reduce cost when mass produced. (F22, G17, SS, Ti)

208-F. **The Rolling Mills at the Port Talbot Plant of the Steel Company of Wales, Ltd.,** H. H. Ascough. *Blast Furnace and Steel Plant,* v. 44, Sept. 1956, p. 1033-1039.

Data on soaking pits, slabbing mill, scale disposal, scarfing machine, ingot sizes. (To be continued.) (F23, ST)

209-F. (English.) **Forging and Pressing of Quality and Special Steels in France.** *Aciers Fins & Speciaux Francais,* no. 23, June 1956, p. 59-63.

Capabilities and methods of the French forging industry. (F22, G1, ST)

210-F. (German.) **Cold Rolling and Drawing of High-Strength Shaped Rope Wires.** Hans Krautmacher. *Stahl und Eisen,* v. 76, no. 17, Aug. 23, 1956, p. 1085-1099.

Considerations and problems in the development of this product. (F28, AY)

211-F. (German.) **Cold Working of Round Steel Wire When Using Different Methods of Shaping. I. Alteration of the Tensile Strength in Drawing, Rolling or Pressing of Round Steel Wire.** Winfrid Dahl and Werner Lueg. *Stahl und Eisen,* v. 76, no. 17, Aug. 23, 1956, p. 1099-1106.

Determination of the tensile strength after drawing, pressing and rolling of round wire with 0.03 and 0.5% carbon. (F28, Q27, CN)

212-F. (German.) **Lubricants and Carriers in the Drawing of Steel Wire.** H. Werner Lueg and Karl-Heinz Treptow. *Stahl und Eisen,* v. 76, no. 17, Aug. 23, 1956, p. 1107-1116.

The drawing load is dependent on the physical and chemical properties of the many oils, soaps and stearates tried. (F28, F1, ST)

213-F. (Polish.) **Drawing Steel Rods.** Kazimierz Janas. *Wiadomosci Hutnicze,* v. 12, July-Aug. 1956, p. 217-223.

Dies, machines and methods of drawing round and irregularly shaped rods. Machines and methods for straightening the finished product. (F27, F29, ST)

214-F. **Rotary Hearth Furnace for Heating Plate Mill Slabs.** F. C. Schoen. *Industrial Heating,* v. 23, Sept. 1956, p. 1813 + 5 pages.

Furnace layout and operation. (F21)

215-F. **Maximum Utilization and Problems of Wide-Strip Rolling and Sheet Finishing Equipment.** H. H. Ascough. *Iron and Steel Institute, Journal,* v. 184, Sept. 1956, p. 24-46 + 1 plate.

Operating details of the 45-in. slabbing mill and 80-in. hot and cold strip mills of a Welsh steel plant. (F23, ST)

216-F. **Forging Super Alloys.** E. Foley. *SAE Journal,* v. 64, Sept. 1956, p. 35-36.

Forgings made from "exotic" alloys have extra-special properties and require extra-special care. (F22, SG-h)

217-F. **How Temperature Affects Strip.** E. L. Robinson and D. T. Goettge. *Steel,* v. 139, Oct. 1, 1956, p. 164, 166.

Effect of finishing and coiling temperatures on a conventional rimmed steel. Characteristics of good strip. (F23, ST)

218-F. **Automatic Forming of Wire Products.** Edmund D. Sickels. *Wire and Wire Products,* v. 31, Sept. 1956, p. 1008-1009, 1044-1045.

Flexibility and versatility of "four-slide" machines. (F28)

219-F. **Wire Flattening.** Arthur Ball. *Wire and Wire Products,* v. 31, Sept. 1956, p. 993-999, 1053-1054.

Practical aspects of the rolling process: (F28, F29)

220-F. (French.) **Improvements in Hot Extrusion of Nonferrous Metals.** C. Lachaud. *Revue de Metallurgie,* v. 53, no. 8, Aug. 1956, p. 569-573; disc., p. 573-574.

A current review of problems existing in this field and a comparison of practice as influenced by the type of alloy and lubrication of the die. (F24, EG-a)

221-F. (German.) **Investigation of Forces in Tube Drawing.** R. Hantos, J. Heeringer and J. Schey. *Acta Technica Academiae Scientiarum Hungaricae,* v. 15, no. 1-2, 1956, p. 127-140.

The forces developed during plug drawing of mild steel tubes with phosphatized surfaces are determined in mill experiments. (F26, CN)

222-F. (German.) **Working of Metallic Titanium.** L. Gillemot. *Acta Technica Academiae Scientiarum Hungaricae,* v. 15, no. 1-2, 1956, p. 155-167.

By properly chosen rolling and heat treatment methods, elongation of 17% can be attained on a titanium sample of 225 Brinell hardness. (F23, J23, Q23, Q29, Ti)

223-F. (German.) **Measurement and Calculation of Rolling Pressure and**

of Power Demand on the Pilger Tube-Rolling Mill. A. Geleji, J. Schey, K. Fink, R. Hantos and F. Köves. *Acta Technica Academiae Scientiarum Hungaricae,* v. 15, no. 1-2, 1956, p. 205-218 + 1 plate.

Experimental results with compression specimens fitted with extensometer wire spirals and an oscillograph. (F26)

224-F. (Russian.) **Nonuniformity of the Walls of Tubing Made in the Three Roll Mill.** P. K. Teterin, F. A. Danilov and E. S. Trifonov. *Stal',* v. 16, no. 8, Aug. 1956, p. 721-727.

Pipes rolled in the three-roller mill have more uniformity of wall thickness and smoother and more even outer surfaces. (F26, ST)

225-F. (Russian.) **Drawing and Annealing of Copper Wire in One Operation.** V. G. Kalitin. *Vestnik Elektropromyshlennosti,* v. 27, no. 8, Aug. 1956, p. 63-67.

Operation proceeds at normal speed. Final product meets specifications and has a finer surface. (F28, J23, Cu)

226-F. Review of Industry-Wide Blooming and Slabbing Mill Practices. W. E. Dittrich. *Journal of Metals,* v. 8, Sept. 1956, p. 1147-1153.

Facilities and procedures, giving data from 79 mills. (F23, ST)

227-F. Factors Affecting Coiling Temperatures in the Hot Strip Mill. J. G. Sibakin and G. M. Ikeda. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Sept. 1956, p. 1174-1181.

The main factors affecting the drop in temperature between the continuous hot strip mill and the coiler are the finishing temperature, time of contact between water and strip, pressure of the water and the gage of the strip. (F23)

228-F. Lubrication Problems in the Hot Working of Aluminium. *Light Metals,* v. 19, Sept. 1956, p. 281-282.

Some equipment and techniques for lubrication in the forging and die casting industries. (F1, F22, E13, A1)

229-F. Wire Flattening Theory. R. D. Weber. *Wire Industry,* v. 23, Sept. 1956, p. 811-814, 816, 837.

Flattening characteristics of copper wire, calculation of spread. (To be continued.) (F28, Cu)

230-F. (Czech.) **Flakes in Steel.** Jiri Klicka. *Hutnik,* v. 6, no. 8, Aug. 1956, p. 228-230.

Causes of flakes, effect of working methods, measures against flake formation taken during the working processes. (F23, ST)

231-F. (Czech.) **Flaws in Blooms Caused by Incorrect Heating of the Ingot.** Zdenek Volf. *Hutnik,* v. 6, no. 8, Aug. 1956, p. 231-238.

Heating temperature, crack formation, oxidation and decarburization of ingots. (F21, ST)

232-F. (Russian.) **Some Problems of Research on Forces Arising During the Extrusion of Aluminum or Aluminum Alloy Rods Through One or More Die Apertures.** I. Kochish. *Acta Technica Academiae Scientiarum Hungaricae,* v. 15, no. 3-4, p. 381-420.

Determination of the character of the extrusion process and of working stresses during extrusion. (F24, A1)

233-F. (German.) **Load Measurements on a Wide Strip Hot Rolling Mill.** Werner Lueg and Hans Günter Müller. *Stahl und Eisen,* v. 76, no. 19, Sept. 20, 1956, p. 1246-1248.

Devices for measurements of the rolling loads and torques required; practical results. (F23, ST)

234-F. The Use of the Modern Assel Mill in Production of Seamless Tubing. Charles E. Snee. *Iron and Steel Engineer,* v. 33, Oct. 1956, p. 124-134.

The elongator produces seamless tube with superior dimensional control in outside diameter to wall thickness ratios to a maximum of 12 to 1 at the elongator gorge. (F26, ST)

235-F. Stepped Aluminum Extrusions, Present and Future. C. J. Huffman. *Western Machinery and Steel World,* v. 47, Oct. 1956, p. 76-80.

Single, and perhaps multiple, stepped aluminum extrusions can simplify part design. Production procedures, mechanical properties and potential applications. (F24, Q general, A1)

236-F. Automotive Zigzag Spring Wire. Webster J. Van Horn. *Wire and Wire Products,* v. 31, Oct. 1956, p. 1184-1186; 1258-1259.

Current manufacturing practice and procedures for controlling quality. (F28, T7)

237-F. Drawing Quality Aluminum Wire. O. L. Burtenshaw and Richard E. Hutchinson. *Wire and Wire Products,* v. 31, Oct. 1956, p. 1197-1198, 1259-1262.

Basic principles of drawing, die design, suggestions from production experience. (F28, A1)

238-F. Wire Flattening Theory. II. R. D. Weber. *Wire Industry,* v. 23, Oct. 1956, p. 913-914.

Development of theory from collected data and calculations. (F28, ST)

239-F. Notes on the Ugine-Séjournet Extrusion Process. J. Séjournet. Paper from "A Study of the Iron and Steel Industry in Latin America". v. II. United Nations, p. 382-385, 391-392.

Types of presses, production operations and costs. (F24, ST)

240-F. (French.) **Study of Scales Formed on Ingots.** J. Moreau. *Revue de Métallurgie,* v. 53, no. 9, Sept. 1956, p. 703-714.

Scales on mild rimming steels before and after reheating in soaking pits studied by optical micrography, X-rays, and chemical analysis. (F21, M general, ST)

241-F. (German.) **Difficulties in Controlling Furnace Pressure.** Rudolf Jeschar. *Stahl und Eisen,* v. 20, no. 76, Oct. 4, 1956, p. 1284-1289.

Curve of furnace pressure, effect of leakage gap of throttle valve, infiltrated air, recuperator operation, occurrence of oscillation phenomena, remedial measures. (F21)

242-F. (Polish.) **Comparison of Roll Pressure Calculation Methods in Cold Rolling of Strip With Forward and Back Tension.** A. Galanty. *Prace Instytutow Ministerstwa Hutnictwa,* v. 4, no. 8, 1956, p. 215-229.

Optimal methods are established by calculations according to six different authors. (F23, Cn)

243-F. (Polish.) **Cold Rolling of Thin Steel Sheets.** Zygmunt Polek. *Wiadomosci Hutnicze,* v. 12, no. 9, Sept. 1956, p. 271-278.

General principles and practice. Description of process from preparation of the ingot to final treatment of the sheets. (F23, ST)

244-F. "Stepped" Aluminum Extrusions. C. J. Huffman. *Light Metal Age,* v. 14, Oct. 1956, p. 12-15.

Continuous extrusion of major and minor sections by interrupting process only long enough to change dies. Effects of abrupt change in flow pattern on mechanical properties. (F24, Q general, Al)

245-F. (Russian.) **Rolling of Railroad Rails.** B. V. Merekin. *Stal',* v. 16, no. 9, Sept. 1956, p. 803-805.

Prevention of rail deformation due to a torsional moment developing when the rail leaves the slanted roller groove. Suggests a shift of the center of gravity of the groove. (F23, ST)

246-F. (Russian.) **Continuous Rapid Heating of Tubing Before Reduction.** N. Iu. Taits, G. N. Kheifets and V. B. Tov. *Stal',* v. 16, no. 9, Sept. 1956, p. 826-830.

Advocates replacement of low-efficiency and unwieldy compartment kilns by continuous rapid-heating sectional furnaces. Advantages. (F21, ST)

SECTION G

SECONDARY MECHANICAL WORKING

1-G. Apply Correct Clearance and Speed When Drawing Stainless Steels. Stanley R. Cope. *Metalworking Production,* v. 99, Oct. 28, 1955, p. 1830-1833.

Includes diagrams, tables. (G4, SS)

2-G. How Modern Materials Influence Sheet-Metalworking. *Metalworking Production,* v. 99, Oct. 28, 1955, p. 1834-1838.

Summary of papers given at the recent special conference on Modern Materials of the Sheet and Strip Metal Users' Technical Association. Photographs, tables, graphs. (G general)

3-G. Micromachining With Virtual Electrodes. A. Uhlir, Jr. *Review of Scientific Instruments,* v. 26, Oct. 1955, p. 965-968.

Minute holes were drilled in germanium, molybdenum, iron, copper, silver and tungsten carbide by electrolytic etching. The flow of current is localized by a nonconducting partition in the electrolyte. Graph, diagrams. (G17, Ge, Mo, Fe, Cu, Ag, W)

4-G. How to Form Stainless Steel. *Steel,* v. 137, Nov. 14, 1955, p. 112-115.

Guide to help find right material and best method. Photographs, diagrams, table. (G general, SS)

5-G. Press Operations on Stainless Steel. Richard E. Paret. *Tooling and Production,* v. 21, Nov. 1955, p. 75-78.

Cutting, blanking and punching, perforating, bending and roll forming, deep drawing, heat treating, including annealing. Photographs, table. (G1, J23, SS)

6-G. Press and Spinning Roll Operations Team up for Greater Efficiency. John H. Bauer. *Tooling and Production,* v. 21, Nov. 1955, p. 83-86.

Application of these techniques to fabrication of automatic washing machine baskets. Photographs, diagrams. (G1, G13, G11, ST)

7-G. (German.) **Flames.** K. W. Sippell. *Metalloberfläche,* Ausgabe A, v. 9, no. 10, Oct. 1955, p. 147-162.

Application of flame in preparing metal surface for painting; advantages over chemical and other methods; estimation of comparative costs. Photographs, table, graphs, diagram. 53 ref. (G22, L10)

8-G. (German.) **Relation Between Flame Method Application and Endurance of Construction Parts.** Siegfried Berg and K. W. Sippell. *Metalloberfläche,* Ausgabe A, v. 9, no. 10, Oct. 1955, p. 179-185.

Application of flame on exchangeable construction parts, effects of flame cleaning on the vibration strength of the construction. Diagrams, tables, photographs, graphs. (G22, L10)

9-G. (Russian.) **Effect of Cooling Time of a Part on the Accuracy of Measurements.** V. E. Smirnov. *Vestnik mashinostroeniia,* v. 35, no. 10, Oct. 1955, p. 56-58.

Heating of a cylindrical semi-finished product during cutting affects the accuracy of final dimensions of part being machined. Takes into account thermal deformations of the product during machining for better calculation. Graphs. (G17)

10-G. Slow Speed Sawing of Metals. John Roush. *Finish,* v. 12, Dec. 1955, p. 49-50, 90.

Advantages of slow-speed sawing with toothless and toothed bandsaw blades include lower costs, greater safety, longer blade life. Photographs. (G17)

11-G. Flame - Gouging Performs Many Jobs in Metalworking. *Linde Tips,* v. 35, Jan. 1956, p. 5-9.

Equipment, operation and applications of oxy-acetylene flame cut-

ting and gouging. Photographs, diagrams. (G22)

12-G. Milling Cutters With High Relief Angles. J. Taylor. *Machinery (London),* v. 87, Nov. 4, 1955, p. 1063-1070.

Data for experiments with high-rake cutters, concluding that higher cutting speed is possible for the duration of present tool life, or tool life is prolonged at present cutting speed. Tables, graphs, diagrams, photographs. 5 ref. (G17, CN)

13-G. Special Machine for Milling Notches in Gas Turbine Blade Roots. *Machinery (London),* v. 87, Nov. 4, 1955, p. 1073-1074.

Design and operating efficiency. Photographs. (G17)

14-G. How to Fabricate Welded Steel Tubing. W. E. McFee. *Modern Machine Shop,* v. 28, Dec. 1955, p. 126-131.

Covers swaging, tube-end forming, punching and notching, and drilling. Diagrams, photographs. (To be continued.) (G general, CN)

15-G. Research in Metal Turning. J. C. Hebert and Leif Fersing. *Western Machinery and Steel World,* v. 46, Nov. 1955, p. 70-74.

Methods and equipment developed for setting standards for cutting speeds. Diagrams, graphs, photographs. (G17)

16-G. Heavy Surface Grinding. III. John E. Hyler. *Western Machinery and Steel World,* v. 46, Nov. 1955, p. 78-81.

Describes a grinder similar to a way grinder but having a vertical spindle. The amount of material that can be removed at every pass is limited. Photographs. (G18)

17-G. Report on "Dynatomics". A. McBride. *Western Machinery and Steel World,* v. 46, Nov. 1955, p. 88-91.

A new coolant that may be used on all machining, boring and grinding operations. The coolant contains ingredients that reduce and limit the amount of heat generated by the plastic flow of material during cutting operations. Photographs, diagrams, micrographs, tables. (G21, G17, G18)

18-G. Liquid Honing of Metals. H. H. Finkelnburg. *Henry Brutcher Translation No.* 3596, 10 p. (From *Metall,* v. 7, nos. 9-10, 1953, p. 330-334.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 235-G, 1953. (G19)

19-G. (Russian.) **Study of Distribution of Properties in Surface Layer During Machining of Steel.** I. L. Mirkin and T. A. Sirenko. *Metallovedenie i obrabotka metallov,* 1955, no. 2, Aug., p. 50-56.

Relation between microhardness and original tensile stress in zone of uniform plastic deformation, and between amount of metal removed and surface properties. Tables, diagram, graphs, micrograph. 9 ref. (G17, Q29, ST)

20-G. (Russian.) **Role of Joule-Lenz Heat in Electrical Erosion of Metal.** A. S. Zingerman. *Zhurnal tekhnicheskoi fiziki,* v. 25, no. 11, Oct. 1955, p. 1931-1943.

Erosion is caused by the action of streams of metal vapors caused by the electrical discharge; volume of metal melted by Joule-Lenz heat; influence of contact area; relation of pit diameter to amplitude value of current strength. Photographs, graphs, table. 15 ref. (G17, ST, Al, Cu)

21-G. Heliarc Cutting of Non-Ferrous Metals. *Canadian Metals,* v. 18, Nov. 1955, p. 56-57, 60.

New method of using a gas-shielded arc for cutting increases speed, permits saw-like quality cuts, reduces edge preparation costs in nonferrous metals fabrication. Diagram, pnotographs. (G22)

22-G. Foundry Practice. X. Fettling Operations. William H. Salmon and Eric N. Simons. *Edgar Allen News,* v. 34, Nov. 1955, p. 255-256.

Rumbling, shot blasting and hydroblast; surface treatment; and casting salvage by thermit and gas welding. Diagrams. (To be continued.) (G23, E general, K2, K4)

23-G. Switch to Cold Forming Cuts Production Costs. W. G. Patton. *Iron Age,* v. 176, Nov. 17, 1955, p. 111-114.

Production operations and advantages of cold heading, cold coining and impact extrusion for forming small parts. Photographs, table. (G3, G5, G10, CN)

24-G. Chemical Milling Leads to Stronger Structures. R. W. Spencer and T. F. Freeman. *Iron Age,* v. 176, Nov. 17, 1955, p. 118-119.

Method for chemically "milling" skin sections permits close control and finer tolerances. Cost is 25% that of machining. Part tolerance can be held as close as ± 0.005 in. Photographs. (G17)

25-G. High-Speed Machine Grinds Sintered Parts to Extreme Accuracy.

Iron Age, v. 176, Nov. 17, 1955, p. 124-126.

Parts are ground to a 16 μ in. finish in 3 sec. with a three-station, electrohydraulic grinder. Diagram, photographs. (G18)

26-G. Designing Deep-Drawn Stainless-Steel Parts. Richard E. Paret. *Machine Design,* v. 27, Dec. 1955, p. 185-189.

Determination of drawing limits, finish effects, proper radii, wall taper. Production considerations. Photographs, diagram. (G4, SS)

27-G. Machinability of Sintered Bronze. W. A. Irvine. *Metal Industry,* v. 87, Nov. 25, 1955, p. 446-448.

Machining difficulties encountered at Maytag Co., Newton, Iowa, and methods used to overcome them. Tables, micrographs, photographs. (G17, Cu)

28-G. Copper Tube Production. *Metallurgia,* v. 52, no. 312, Oct. 1955, p. 159-163.

Description of a new plant, equipment and procedure for drawing copper tubes. Photographs. (G4, Cu)

29-G. Aluminum Impact Extrusions. Bernard F. Wade. *Modern Metals,* v. 11, Nov. 1955, p. 35-36, 38, 40.

Details of high-speed cold working process which produces simple or complex parts in broad range of sizes. Advantages include low cost, tough wrought structure, no draft, accuracy and smooth finish. Photographs, tables. (G5, Al)

30-G. Determining Surface Area of Sheet Metal Stampings. L. A. Critchfield. *Products Finishing,* v. 20, Dec. 1955, p. 34-40.

Formulas and nomograms for determining surface areas of stampings which, because of shape and contour, are difficult to measure or calculate from dimensions. Charts. (G3, CN, Al, Cu)

31-G. Grinding Titanium With Abrasive Belts. Hugh N. Dyer. *Steel,* v. 137, Dec. 12, 1955, p. 99.

Abrasives, cutting oils, grinding speeds. Table. (G18, Ti)

32-G. How to Form Zirconium. *Steel,* v. 137, Dec. 12, 1955, p. 113-114.

Equipment and methods for machining, deep drawing, brazing, welding, forging, rolling, extruding. Photographs. (G general, F general, K general, Zr)

33-G. How to Apply Carbide Tooling to Automatics. E. J. Weller. *Tool Engineer,* v. 35, Dec. 1955, p. 103-109.

Application of carbides to multiple bar automatic machines requires attention to details involving the machine, tool design, tool control, materials processed and equipment maintenance. Diagrams, tables, photographs, graphs. (G17)

34-G. Joining and Finishing of Zirconium. V. Machining. E. D. Baugh. Paper from "The Metallurgy of Zirconium". National Nuclear Energy Series, Division VII—v. IV. McGraw-Hill Book Co., p. 326-331.

Tools and procedures for milling, turning, drilling and punching. Diagrams. (G17, Zr)

35-G. Joining and Finishing of Zirconium. VI. Grinding. L. P. Tarasov. Paper from "The Metallurgy of Zirconium". National Nuclear Energy Series, Division VII—v. IV. McGraw-Hill Book Co., p. 331-334.

Equipment and methods. (G18, Zr)

36-G. Roll Formed Sheet Metal Parts. E. J. Vanderploeg. *Materials & Methods,* v. 42, Nov. 1955, p. 100-102.

Metals available, design considerations, cost factors, applications. Photographs. (G11)

37-G. (German.) **Machining of Copper Alloys.** W. Matthey. *Metall,* v. 9, nos. 21-22, Nov. 1955, p. 978-982.

Classification of the alloys into machining groups, types of machining, favorable shaving shape, tool life. Tables, diagrams, photographs. (G17, Cu)

38-G. (Russian.) **Cutting Force in Work With High Feed.** V. F. Paramonov. *Stanki i instrument,* v. 26, no. 10, Oct. 1955, p. 24-26.

Analysis of cutting process and determination of composite factors; elements of wear. Graphs. (G17)

39-G. (Russian.) **Improvement of the Deep Drawing Process for Stainless Steel.** B. Ia. Ketslakh. *Vestnik mashinostroeniia,* v. 35, no. 11, Nov. 1955, p. 51-52.

Selection of optimum hardening methods, selection of most effective lubrication, determination of optimum clearance and degree of surface fineness. Diagrams. 5 ref. (G4, SS)

40-G. Abrasive Belt Grinding of Metals. Hugh N. Dyer. *Industrial and Engineering Chemistry,* v. 47, Dec. 1955, p. 2500-2505.

Some tests on both laboratory and commercial grinding equipment show how metal removal and belt wear vary with different grinding conditions and with different metals. Photographs, graphs. 6 ref. (G18)

41-G. Automatic Size Control. F. R. Boosey. *Instrument Practice,* v. 9, Nov. 1955, p. 1067-1069.

Circuits and description of their functions in machine tool grinding operations. Diagrams. (G18)

42-G. How to Choose the Right Broaching Fixture. Harry Gotberg. *Iron Age,* v. 176, Dec. 8, 1955, p. 135-138.

Choice of work-holding fixture to be used depends on the part itself, production required and machining operations. Discusses most widely used designs of indexing fixtures, shuttles and trunnion devices, with examples of jobs they do best. Photographs. (G17)

43-G. Precision Dies Stamp Difficult Contoured Part. *Iron Age,* v. 176, Dec. 8, 1955, p. 148-149.

A 1½-ton punch insert machined to exact contours used to form intricate sheet steel wheel 5 ft. in diam. Surface at completion of drawing operations is scratch-free and smootn, eliminating the need for further finishing. Manufacturing costs are 80% lower than the original cost of spinning the part. (G4, ST)

44-G. Fluids for Grinding of Titanium. E. J. Krabacher. *Lubrication Engineering,* v. 11, Nov.-Dec. 1955, p. 397-401.

Development of a fluid based on sound metal-cutting principles. A glass-streak test used for screening, since potentially useful grinding fluids prevent wetting of glass by titanium. Micrographs, graphs, and tables. (G18, G21, Ti)

45-G. Coined and Embossed Sheet Metals. Malcolm W. Riley. *Materials & Methods,* v. 42, Dec. 1955, p. 94-97.

Advantages, mechanical properties, fabrication and design, finishes, costs and applications. Graphs, tables, micrographs, photographs. (G3)

46-G. Shot Peening for Safety. *Modern Metals,* v. 11, Dec. 1955, p. 52.

Special methods developed to improve fatigue strength of stress areas in propellers, hub assemblies and other aircraft parts. Photograph. (G23, Q7, Al)

47-G. Abrasive Rolls—New Tools for Metal Finishing. James L. Erickson. *Precision Metal Molding,* v. 13, Dec. 1955, p. 61-62, 64.

Consists of an expendable coil of coated abrasive strip wound and glued tightly together in the form of a roll. Table, photograph, diagrams. (G18)

48-G. Small Piercing Punches. Federico Strasser. *Steel Processing,* v. 41, Dec. 1955, p. 769-771, 798.

Design and materials used in small round punches to decrease problems connected with the use of cutting dies. Diagrams. (G2, ST)

49-G. Cam Machining. Frank W. Hale. *Tool Engineer,* v. 35, Dec. 1955, p. 82-87.

Electronic template and cam machine is capable of following the edge of an electrically conductive live drawing while producing extremely accurate, two-dimensional, milled or ground contours. Diagrams, photographs. (G17, G18)

50-G. Machinery for Sheet Metal Fabrication. John W. Langton. *Welding and Metal Fabrication,* v. 23, Dec. 1955, p. 451-454.

Surveys portions of sheet metalworking field to note any improvements which have been made in design to increase outputs or usefulness. Covers most commonly used items. Photographs. (G2, G6, G15, ST)

51-G. New High-Speed Cutting Material. *Western Machinery and Steel World,* v. 46, Dec. 1955, p. 78-79.

Machining speeds in the 2500 sfm. range predicted with use of cemented oxide. Micrograph, photographs. (G17)

52-G. (Czech.) **For Better Quality of Safety Razor Blades.** Vladimir Sekanina. *Hutnické listy,* v. 10, no. 11, Nov. 1955, p. 665-673.

Czechoslovakian methods for producing razor blades compared with procedures in other countries. Tight production control measures are required to make a high quality product. Tables, micrographs, diagrams. 5 ref. (G general, T10, CN)

53-G. (Czech.) **Strength of Sintered-Carbide Cutting Inserts.** J. Koloc and J. Preisler. *Strojirenstvi,* v. 5, no. 10, Oct. 1955, p. 751-758.

Effect of different moduli of elasticity of cutting tip and tool shank. Factors affecting life of cutting tools. Photographs, tables, graphs, diagrams. 7 ref. (G17, T6, C-n)

54-G. (French.) **Acetylene in Heavy Industry.** E. J. H. Elsworth. *Revue de la soudure (Brussels),* v. 11, no. 3, 1955, p. 117-125.

Description of industrial practices, which, because of their particular nature, require the utilization of oxy-acetylene. Photographs. (G22)

55-G. (Russian.) **How to Cut Steel Semiproducts and Castings of Great Thickness.** A. N. Shashkov and S. G. Guzov. *Svarochnoe proizvodstvo,* 1955, no. 11, Nov., p. 23-26.

Nature of two processes taking place in metal being cut. Design and operation characteristics of oxygen torches and oxy-cutting machines.

Tables, photographs, diagrams. 6 ref. (G22, ST)

56-G. How to Design Die Blocks. J. R. Paquin. *American Machinist,* v. 100, Jan. 2, 1956, p. 88-93.

Eighteen illustrated methods for applying die blocks to small, medium and large cutting dies. Tables, diagrams. (To be continued.) (G1)

57-G. Finish vs. Tool Rake. Max J. Kuderko and Claude A. Potter. *American Machinist,* v. 100, Jan. 2, 1956, p. 115, 117, 119.

Positive rake toolholder is useful for machining soft materials and is helpful to shops using older machines unable to take required cuts with negative rake toolholders. Micrographs, photographs, table. (G17, Al, Cu, CN, AY)

58-G. Special Planer Mills Intricate One-Ton Castings. *Iron Age,* v. 176, Dec. 15, 1955, p. 98-99.

Large castings are rough and finish machined in a multiple series of operations. Two coordinated horizontal milling heads work with two vertical heads to minimize production costs. Photographs. (G17, ST)

59-G. (Japanese.) **On the Shot for Peening. II.** Michira Uchiyama and Kazunori Kamishohara. *Iron & Steel Institute of Japan, Journal,* v. 41, no. 10, Oct. 1955, p. 1093-1097.

Effect of shot size, hardness and speed on the coverage, peening intensity, surface roughness of the work. Graphs. 5 ref. (G23)

60-G. (Book.) **Fundamentals of Press Tool Design.** W. F. Walker. 152 p. 1955. Philosophical Library, Inc., 15 East Fortieth St., New York 16, N. Y. $4.75.

Identifies and clarifies the fundamental requirements for press operations to permit design of tools which can be operated efficiently and economically. (G1)

61-G. Machining Thin Sections. *Aircraft Production,* v. 17, Dec. 1955, p. 472-476.

Machining large-diameter thin-section parts of less than 0.20 in. thickness presents a number of difficulties. Of these, the gradual build-up of vibration by resonance and deformation of the part by spinning-over of the material are the most important. The most successful approach as yet employed for this class of operation is the balanced-cut double-sided turning technique, where the tools are traversed across the surfaces simultaneously. Photographs, diagrams. (G17, SS)

62-G. Automation Applied to Sheet Metal Blanking. Joseph F. Lyden. *Automation,* v. 3, Jan. 1956, p. 34-37.

An economic comparison case study using coil stock as opposed to cut sheet stock. Diagrams, photographs, tables. (G2, A4, ST)

63-G. Ultrasonic Machining of Brittle Materials. Maurice S. Hartley. *Electronics,* v. 29, Jan. 1956, p. 132-135.

Slicing germanium, silicon, quartz, ferrites, glass-bonded mica and other material at high speed by impact grinding results in greater precision and makes possible a great variety of shapes. Photographs, diagrams, table. (G18)

64-G. So You're Going to Buy a Press? M. D. Verson. *Iron Age,* v. 176, Dec. 22, 1955, p. 71-73.

Tips on hydraulic and mechanical presses, rated capacities, speeds, adjustment and safety features, lubrication systems. (G1)

65-G. Screw Machine Attachment Rolls Accurate Threads. W. G. Patton. *Iron Age,* v. 176, Dec. 22, 1955, p. 74-75.

A new type of thread rolling attachment on six-station automatic bar machines aids rocker arm valve stud production and assures accuracy of threads within 0.0005 in. Diagrams, photograph. (G12)

66-G. Technique for Machining Tungsten. *Machinery (London),* v. 87, Dec. 9, 1955, p. 1358-1360.

Copper is infiltrated into the porous matrix and removed by evaporation after the metal cutting operations. Photograph, micrograph. (G17, W)

67-G. Recommended Practices for Uranium Finishing. William B. Harris. *New York Operations Office (U. S. Atomic Energy Commission),* NYO-1516, May 1955, 13 p.

Specific machining practices, consistent with the maintenance of acceptable levels of airborne uranium, include the various tools for each type of machining job with recommended tool speeds, coolant flows, ventilation requirements. Diagram. (G17, F29, U)

68-G. (Czech.) **Lathes for Milling Gears With Spiral Teeth.** L. Lichnovsky. *Strojirenska vyroba,* v. 3, no. 10, Oct. 1955, p. 405-408.

Recommended feed rates and angles. Table, diagrams, photographs. (G17, ST)

69-G. (Czech.) **Cold Punching of Aluminum.** J. Odehnal and K. Marvan. *Strojirenska vyroba,* v. 3, no. 10, Oct. 1955, p. 413-417.

Detailed description of inverted punching operations. Diagrams, tables. (G2, Al)

70-G. (Czech.) **Mechanical-Chemical Lapping.** J. Ricka. *Strojirenstvi,* v. 5, no. 9, Sept. 1955, p. 682-684.

Chemical effects acting on surfaces being machine-finished. Comparison of usual superfinish with mechanical-chemical lapping and advantages of the latter. Tables, graphs, diagram. 8 ref. (G19)

71-G. (French.) **The Plastic Deformation Mechanism on Metal Cutting Operations and Resulting Deformations.** Paul Bastien and Michel Weisz. *Revue de métallurgie,* v. 52, no. 11, Nov. 1955, p. 837-863.

Current literature critically reviewed. Study is based on experimental examination of oriented crystal structure of chips. Results are related to shearing and chip friction angles and rake. Graphs, diagrams, photographs, micrographs, tables. 20 ref. (G17, Q24)

72-G. (French.) **Belgian Research on Machinability of Metals.** H. Herbiet and L. Czaplicki. *Revue universelle des mines,* v. 11, ser. 9, no. 11, Nov. 1955, p. 544-558.

Results of research on the development of special test equipment; determination of machinability of certain Belgium steel and a comparison with American steel of the same type. Determination of differences in machinability of steels to improve quality of Belgium steels. Tables, diagrams, photographs, micrographs. (G17, ST)

73-G. (French.) **Contribution to the Analytical Study of Efficiency of Lubricants Used in Metal Machining.** F. Eugene. *Revue universelle des mines,* v. 11, ser. 9, no. 11, Nov. 1955, p. 582-594.

Comparison of conditions of dry and lubricated machining. Influence of lubricant on the temperature of cutting and on wear resistance of tools. Tables, graphs, micrographs. 5 ref. (G21, G17, ST)

74-G. (German.) **Electro-Erosive Method of Metal Machining.** H. Opitz. *Revue universelle des mines,* v. 11, ser. 9, no. 11, Nov. 1955, p. 562-568.

Short review of methods other than with machine tools. Conditions of operation, equipment, advantages and application of the electro-erosive method. Diagrams, table, photographs, micrographs. 4 ref. (G17)

75-G. (Russian.) **Drawing of Heat-Resistant Alloy With High-Pressure Jet Cooling Liquid.** N. F. Pronkin. *Stanki i instrument,* v. 26, no. 11, Nov. 1955, p. 26-27.

Die cooling system, using a 10% emulsion with 2% of sulfo-"fresol" with jet aperture of 1-mm. and pressure of 25 kg. per sq.cm., doubles life of dies. Graphs, diagrams. (G21, G4, SG-h)

76-G. Short Run Specialists in Metal Stamping. V. W. Danielson. *Finish,* v. 13, Jan. 1956, p. 94-96.

Methods of operation and tooling ingenuity used for "nuisance" stamping jobs. Photographs. (G3, ST, Al, Cu)

77-G. 'Diamond Substitutes' in the Soviet Union. W. G. Cass. *Industrial Diamond Review,* v. 15, Dec. 1955, p. 226-227.

Lack of diamonds, necessary for precision, initiates investigation of nondiamond truing of grinding wheels in Soviet Union. Tables. 2 ref. (G18, C-n)

78-G. Diamond Tools for Producing Sheetmetal Dies. K. Sterl. *Industrial Diamond Review,* v. 15, Dec. 1955, p. 232-234.

Diamond-impregnated tools now make possible satisfactory machining of hardened steel. Diamond lapping pastes can be used for quick surface corrections. Photographs, tables. (G18, G19, ST)

79-G. How Does a Contract Stamper Choose a Press? C. C. Caditz. *Iron Age,* v. 177, Jan. 19, 1956, p. 67-69.

Characteristics of this branch of stamping industry; evaluates press versatility, auxiliary equipment, sturdiness vs. speed, replacement formulas. Photograph. (G3)

80-G. The Increasing Use of Abrasive Cutting. E. J. DeWitt. *Machinery (London),* v. 88, Jan. 6, 1956, p. 22-23.

Clean, accurate, economic cutting by the latest abrasive wheels and cutting-off machines. Photographs. (G17, G18)

81-G. Sheet-Metal Fabrication in Britain. Tom Bishop. *Metal Progress,* v. 69, Jan. 1956, p. 75-77.

Some aspects of industrial practices, especially finishing operations. Stiff, high-temperature alloys are successfully formed with a soft metal punch which itself deforms into the shape best adapted to each intermediate stage. Diagram, photographs. (G1, Al, Ni)

82-G. Heat Treatment of Steel for Good Machinability. H. Opitz, S. Ammareller and H. Koelzer. *Metal Progress,* v. 69, Jan. 1956, p. 108-114.

Suitable heat treatments for minimizing cratering and giving smooth

surface finish; machinability in relation to shear strength. Diagrams, graphs, micrographs.
(G17, J general, ST)

83-G. Some Overseas Developments in Surface Finish. C. A. Gladman. *Microtecnic (English Ed.)*, v. 9, no. 5, 1955, p. 229-244.

Effect of surface finish on functions of engineering products and factors affecting finish in machining. 58 ref. (G17, G18, G19)

84-G. High Frequency Electro-Spark Machining of Hard Metals. *Microtecnic (English Ed.)*, v. 9, no. 5, 1955, p. 267-271.

Revolutionary machining method improves present techniques and enables use of previously unmachinable alloys. Diagrams, photographs. (G17)

85-G. Machining Work-Hardened Alloy Steels. W. M. Halliday. *Tooling and Production*, v. 21, Jan. 1956, p. 64-66, 108, 110.

Some common causes of work hardening, with emphasis on the practical measures to be followed in the machine shop for correcting the condition during the machining of stainless steel parts so that their completion may be simplified and facilitated. Photographs.
(G17, SS, AY)

86-G. (French.) Some Physical-Chemical Aspects of Oxygen Cutting. Claude Decroly and Guy Genin. *Revue de la soudure (Brussels)*, v. 11, no. 4, 1955, p. 214-225.

Introduction and theoretical considerations, study of combustion of soft steel in oxygen. Graphs, diagrams, tables. (To be continued.)
(G22, CN)

87-G. (German.) Comparative Studies on the Qualification of Single and Multi-Jet Blowpipes for Heating in Hot Forming. K. Boeckhaus and H. Ehrenberg. *Schweissen und Schneiden*, v. 7, no. 12, Dec. 1955, p. 488-495.

Effect of heat on transition temperature; resistance to plastic deformation and structure of carbon steels. Equipment and its selection. Photographs, graphs, tables. 8 ref.
(G general, Q24, CN)

88-G. Machinability Testing-Relation Between Cutting Temperature and Tool Life for Gray Irons. E. A. Loria and D. R. Walker. *American Foundrymen's Society, Transactions*, v. 61, 1955, p. 261-263; disc., p. 264-266.

Lower cutting forces and temperatures lengthen tool life. Photographs, micrographs, graphs, tables. 4 ref. (G17, CI)

89-G. Learn Tricks of Bending Wrought Iron Pipe. A. C. Curran. *Canadian Power Engineer*, v. 16, Nov.-Dec. 1955, p. 34-36.

Proper method of pipe bending. Diagrams, photograph, table.
(G6, Fe)

90-G. Causes and Control of Distortion During Machining of Aluminum Alloy Forgings. Loyl R. Thomas and Harry J. Gilliland. *General Motors Engineering Journal*, v. 3, Jan.-Feb. 1956, p. 28-33.

Experiments led to reduced distortion, elimination of several laborious operations, saving in time and money. Photographs, diagrams, tables. (G17, Al)

91-G. How to Design for Top Fabricating Economy. *Iron Age*, v. 177, Jan. 26, 1956, p. 78-81.

Physical properties of raw materials, fabrication methods and design given as essential elements of economical fabrication. Diagram, photographs. (G general)

92-G. Permanent Dies Pare Hammer Stamping Costs. *Iron Age*, v. 177, Jan. 26, 1956, p. 82.

For producing hammer stampings in limited quantities, lead-Kirksite dies are among the most practical low-cost tools available; for longer runs, lead-Meehanite tooling has resulted in a cost saving. Photograph.
(G3)

93-G. Applications of Thread and Form Rolling. C. T. Appleton. *Machine Design*, v. 28, Jan. 26, 1956, p. 101-104.

Advantages of rolled threads compared with common thread finishes. Diagrams, photographs, tables.
(G12)

94-G. Powder Cutting. E. T. Casey. *Metal Industry*, v. 88, Jan. 13, 1956, p. 23-27.

Equipment and procedures for cutting alloys steels and nonferrous metals, using finely divided iron powder added to reaction zone to assist oxygen cutting reaction. Photographs, diagrams, table. 1 ref.
(G22, SS, AY, Ni, Cu, Al, Zn)

95-G. Complementary Economies in Blanking From Cut Sheet. *Mechanical World and Engineering Record*, v. 136, Jan. 1956, p. 26-28.

Design of dies and tools, procedures for removing the blanks, determination of blanking pressure. Diagrams, table. (G2)

96-G. Coated Abrasive Finishing. C. Perrett. *Metal Industry*, v. 88, Jan. 13, 1956, p. 28-31.

Development of belt grinding machines for foundry use and the three categories into which they have been split, according to the part of belt

used. Photographs, diagrams, graph. (G18, E general)

97-G. Applying Carbides to Bar Skimming. Ugo Wegner and Hans Lindemann. *Metalworking Production*, v. 99, Dec. 30, 1955, p. 2209-2214.

Problems involved and how they were overcome. Diagrams, photographs. (G17)

98-G. The Precision Touch in Grinding. Mike Curtis. *Steel*, v. 138, Jan. 23, 1956, p. 70-71.

Strict adherence to set of rules in roller bearing plant results in increased accuracy and quality of product. Photographs. (G18)

99-G. A Look at Numerical Control for Machine Tools. R. Lowell Hand. *Western Machinery and Steel World*, v. 47, Jan. 1956, p. 74-78.

Numerical concept of recording information for tape control of machine tools; methods used in machining of skins for aircraft wings; future aims for improving production operation by utilizing numerical control methods. Photographs, diagrams, table. (G17, Al)

100-G. (Book.) Die Design Handbook. Frank W. Wilson, Ed. McGraw-Hill Handbook. 694 p. 1955. McGraw-Hill Book Co., Inc., 330 West 42nd St., New York 36, N. Y.

Reference book containing practical information on product design, metal movements, process analysis, materials, and proved die designs for every class of sheet-metal press-working. (G1)

101-G. Propane Gas for Metal Cutting. G. G. M. Carr-Harris. *Canadian National Research Council, Technical Information Service Report No.* 46, Dec. 1955, 15 p.

Discussion of propane as a fuel for both domestic and industrial use, and the process of oxy-gas cutting. References on LP-gas for metal cutting are listed. 42 ref. (G22)

102-G. Application of Adhesive Tapes in the Metal Working Industries. *Machinery (London)*, v. 87, Dec. 30, 1955, p. 1507, 1555.

Uses include masking for painting, protection of polished metal surfaces during machining or pressing operations, holding parts in place during assembly, marking edges of gangways and machining areas, sealing joints, identification of materials. (G general, L26, S10)

103-G. Accelerated Slide Motions Increase Output of Draw Presses. Ernest C. Morse. *Modern Industrial Press*, v. 18, Jan. 1956, p. 15-18.

Drag link drive, special linkages, dynamatic clutch, double clutch and the two-speed planetary clutch are all considered practical for accelerating the slide motions of lead draw presses. Methods and applications. Photographs. (G4)

104-G. Some Aspects of the Use of Ferritic Chrome Iron in Sheet Form. J. N. Edwards and A. A. Pearson. *Sheet Metal Industries*, v. 33, no. 345, Jan. 1956, p. 17-23; disc., p. 23-24, 40.

A 17% chromium iron is considered with particular reference to its workability, manufacture, resistance to corrosion and electrolytic polishing. Phototgraphs, tables. (G general, R general, L13, SS)

105-G. Reducing Costs in the Manufacture of Hollow-Ware. J. W. Langton. *Sheet Metal Industries*, v. 33, no. 345, Jan. 1956, p. 43-46.

Mechanization in hollow-ware manufacture accelerates production and reduces costs. Manufacturing operations described. Diagrams, photographs. (G1)

106-G. Ford Operating New Cleveland Stamping Plant. *Steel Processing*, v. 42, Jan. 1956, p. 37-41, 50.

Notable features are use of latest automation techniques, elaborate materials handling devices, modern quality control methods. Photographs. (G3, A5, S12)

107-G. Machining Germanium to Conserve Material. Robert L. Crane. *Tool Engineer*, v. 36, Feb. 1956, p. 85-87.

Design, operation and applications of machine for precision slicing germanium into small pieces for use in transistors. Photographs, diagram. (G17, T1, Ge)

108-G. Retooled Punch Press Set-up Stamps Out Parts 200% Faster. Howard E. Jackson. *Western Metals*, v. 14, Jan. 1956, p. 63-65.

How metal forming machines have been adapted to efficient production of aluminum draperies, awnings, venetian blinds, etc. Punch presses installed in the stamping department are equipped with automatic coil stock reel, progressive dies fed by Dickerman hitch, roll feeds and air ejectors. This setup has increased production 200% over old method of shearing and hand feeding pieces into machine. Photographs. (G2, G3, Al)

109-G. New Heliarc Cutting for Non-Ferrous Metals Trims Cost, Permits Saw-Like Quality Cuts. *Western Metals*, v. 14, Jan. 1956, p. 66-67.

New process for cutting and shaping aluminum and other nonferrous metals. Advantages are speed, ease

of application mechanically or manually, smooth cut surface, high efficiency and easy adaptability to position and contour. Diagrams, photographs. (G22, Al)

110-G. The Cold Roll Forming Process. *Automobile Engineer,* v. 46, Jan. 1956, p. 34-36.

A rapid and accurate method for producing a wide variety of shapes. Photographs. (G11)

111-G. Present Position and Knowledge of Peening. Otto Forsman. *British Welding Journal,* v. 3, Feb. 1956, p. 49-52.

Methods and effect of peening. 13 ref. (G23)

112-G. New Carbide Tool Drills Cast Iron Ten Times Faster. *Iron Age,* v. 177, Feb. 9, 1956, p. 87-89.

Precision hole drilling at rates up to 60 ipm. in solid cast iron, bronze and aluminum, and up to 20 ipm. in steel is possible with a new carbide tipped tool. Hollow drill produces both chips and solid core. Regrinding is simple. Photograph, table, diagram. (G17, CI, Al, Cu, ST)

113-G. Control Heat to Drop Titanium Forming Costs. A. E. Leach and H. M. Lundstrom. *Iron Age,* v. 177, Feb. 9, 1956, p. 98-101.

Hot forming minimizes springback, thus reducing time, labor and cost of fabrication. Photographs, table, graphs. (G general, Q21, Ti)

114-G. Leaded Forging Steels. Kenneth Rose. *Materials & Methods,* v. 43, Jan. 1956, p. 104-105.

Leaded steels are desirable for forged parts when good machinability is needed. Chemical composition, applications and method for adding lead. Photographs, table. (G17, F22, Pb, ST)

115-G. Power and Carbide Mill Rotor Slots. A. Maerkle. *Metalworking Production,* v. 100, Jan. 13, 1956, p. 47-54.

Cutting forces involved, tests to determine optimum speeds and feeds consistent with favorable tool life; analysis of costs. Diagrams, graphs, photographs, tables. (G17)

116-G. Forming Titanium Sheet. Richard E. Pitts. *Product Engineering,* v. 27, Feb. 1956, p. 135-139.

Specific design recommendations for simple bending, drawn flanges, rubber forming, stretch forming and drop hammer forming; allowances for springback; how to prevent waviness in flanges and oil-can buckling; design of beaded panels; limitations in forming large radii. Diagrams, graphs. (G general, Ti)

117-G. Flame Cutting for Nonferrous Metals. R. M. Gage. *Product Engineering,* v. 27, Feb. 1956, p. 170-173.

Advantages of torch cutting, as applied to steel, are brought to shaping and cutting nonferrous metals such as aluminum, copper and brass. Photographs, tables. (G22, Al, Cu)

118-G. Taps and Tapping. Alan G. Dimond. *Western Machinery and Steel World,* v. 47, Feb. 1956, p. 68-71.

Tapping operations in the production of the M59 armored personnel carrier. Photographs, tables. (G17, ST)

119-G. Deep-Drawn Electronic Cases. *Western Machinery and Steel World,* v. 47, Feb. 1956, p. 82-84.

Burbank firm has developed techniques and equipment which make deep drawing pay off even on short runs. Photographs. (G4)

120-G. (Czech.) Machining Sintered Carbides by Electrical Methods. J. Zizala. *Strojirenska vyroba,* v. 3, no. 8, Aug. 1955, p. 312-313.

Advantages of electrical methods over usual grinding and polishing by diamonds or silicon carbide. Factors affecting efficiency of electromachining method, quality of tool surfaces obtained. Graphs, micrographs. 3 ref. (G18, C-n)

121-G. (Czech.) Use of Electro-Erosion Method for Intricate Parts and for Rehabilitating Worn Dies. F. Petrasek. *Strojirenska vyroba,* v. 3, no. 9, Sept. 1955, p. 365-367.

Development of electro-erosion for machining complex slots and splines for steam-turbine vanes and for renewing worn dies and inserts. Equipment and operating instructions, including electrode, voltage, cooling liquid. Photographs, diagrams. (G17, C-n)

122-G. (Czech.) Hot Forming With Electric Resistance Heated Dies. A. Schaffer and M. Blazek. *Strojirenska vyroba,* v. 3, no. 9, Sept. 1955, p. 368-370.

Heating the blank right in the die results in improved mechanical properties of parts formed, elimination of subsequent machining, and better release from die. Tables, diagrams. (G1, Q general)

123-G. (French.) Electro-Erosion and Electric-Spark Machining; Present Status and Future Prospects. Marc Bruma. *Schweizer Archiv für angewandte Wissenchaft und Technik,* v. 22, no. 1, Jan. 1956, p. 18-22.

Historical review of process. In-

fluence of different factors on machining rate, surface finish, electrode wear. Table, diagram, micrographs, graph, photographs. 23 ref. (G17, SS, AY, Ni, Al)

124-G. Blow Stampings and Use Cheaper Dies. Wallace C. Mills. *American Machinist,* v. 100, Feb. 13, 1956, p. 121-123.

Describes low-cost, high-speed process by which small, light, metal stampings are blanked and drawn in one punch press and blown to other presses for secondary operations. Equipment consists of a chute with a compressed-air blast and a lateral slide-feed die. Diagrams. (G2, G3)

125-G. Use Multiple-Item Templates and Electronic Controls in Flame Cutting. *Industry & Welding,* v. 29, Feb. 1956, p. 65-67, 118.

Methods for mass producing weldment parts that are uniformly accurate and fit precisely and smoothly, assuring maximum strength with minimum of weld time and human supervision. Photographs. (G22, ST)

126-G. Transfer Machine Makes Crankshafts Initially Straight. W. G. Patton. *Iron Age,* v. 177, Feb. 23, 1956, p. 87-89.

A four-station automatic transfer unit does a very accurate job on initial machining of crankshaft forgings. Photographs, diagram. (G17)

127-G. Continuous Line Stamps, Welds Housings Faster. Herbert Chase. *Iron Age,* v. 177, Feb. 23, 1956, p. 90-93.

In revamping a production setup to accommodate 0.180-in. thick sheet steel required in a new housing design, it was found possible to shift to less costly and more easily handled coil stock. Photographs. (G3, K1, ST)

128-G. A Radioactive Study of the Metal-Cutting Process. I. Finnie and E. Rabinowicz. *Lubrication Engineering,* v. 12, Jan.-Feb. 1956, p. 29-31.

Autoradiographs were taken of tools used to cut radioactive copper. The variation of metal transfer to the tool was determined as function of rake angle, depth of cut and type of cutting fluid. Diagrams, tables, autoradiographs. 7 ref. (G17)

129-G. Face Milling Titanium 150A. L. Fine and F. Menelaus. *Machinery (London),* v. 88, Feb. 3, 1956, p. 210-212.

Cutter geometry and design, tooth loading, workpieces used for tests, test results. Photographs, diagrams. (G17, Ti)

130-G. Metal Machining. VI. Cutting Fluids. W. Alfred Carter. *Machinery Lloyd (Overseas Ed.)* v. 28, Jan. 21, 1956, p. 69-75.

Cutting fluids and methods of application for most efficient dispersion of heat. Photographs, diagrams. (G17)

131-G. Working Stainless Steels. J. Lomas. *Machinery Lloyd (Overseas Ed.)* v. 28, Jan. 21, 1956, p. 83-85.

Procedures for working and characteristics of martensitic, ferritic and austenitic types as they affect working methods. (G general, F22 SS)

132-G. Electric Arc Cutting. *Metal Industry,* v. 88, Jan. 27, 1956, p. 67-68.

Nonferrous metal cutting by a method which is easy to operate either mechanically or manually, applicable to circular and contour cutting, which greatly increases the shaping speed and leaves smooth cut faces. Photographs, diagram, table. (G22, Al)

133-G. Nomograph for Grinding Costs. William G. Slack and James T. Zawodni. *Steel,* v. 138, Feb. 6, 1956, p. 118-119.

Construction and use of nomograph for constant check on grinding cost per billet ton, or cost per pound of metal removed. Nomograph. (G18)

134-G. Shot Peening for Safety. *Steel Processing,* v. 42, Feb. 1956, p. 103-104, 110.

Propellers are shot peened to improve fatigue strength of material at points of greatest stress. Machines, operations and abrasives discussed. Photographs. (G23, Q7, Al, ST)

135-G. Error Diagnosis in Carbide Trouble Shooting. Antoni Niedzwiedzki. *Tooling and Production,* v. 21, Feb. 1956, p. 75, 76, 130, 132.

A guide in carbide trouble shooting. Discussion follows an error determination chart, giving a survey of different machining troubles as a function of tooling or of operating. Table. (G17)

136-G. How Cutting Rates Can be Adjusted to Extend Tool Life. B. Gisner, W. Ohlson and G. Heden. *Tooling and Production,* v. 21, Feb. 1956, p. 83 + 4 pages.

Report on a turning investigation on bars of steel SAE 1086 of various carbide grades, to determine the best ratio of speed to feed for

a minimum of tool wear. Graphs, photographs. (G17, ST)

137-G. Machining Work-Hardened Alloy Steels. II. W. M. Halliday. *Tooling and Production,* v. 21, Feb. 1956, p. 87 + 4 pages.

Efficient and economical means for overcoming work hardening so that machining may be completed. Diagrams. (G17, G18, AY, SS)

138-G. Comparative Testing Confirms Oxypropane Cutting Value. Jay Bland. *Welding Engineer,* v. 41, Feb. 1956, p. 22-24.

Compares characteristics of oxypropane and oxy-acetylene in the cutting of steel. Photographs, tables. (G22, ST)

139-G. New Concepts in Cold Roll Forming Boost Use of Special Shapes. *Western Metals,* v. 14, Feb. 1956, p. 53-55.

Advantages include close tolerances, smooth, clean surfaces, uniformity of thickness and profile and simplicity of process. Some new applications of cold rolled shapes are listed. Photographs. (G11, ST)

140-G. (Book-German.) **Production and Use of Cooling Fluids and Lubricants in Metal Cutting.** R. N. Oscher. (Translated from the Russian by Elfriede Bluhm.) 182 p. 1954. Fachbuchverlag, Leipzig, Germany.

Properties, applications, selection, composition, conditioning of unstable emulsions, special characteristics, recovery, and safety measures. (G21)

141-G. Sandwich-Skin Construction in the Handley Page Herald. *Aircraft Production,* v. 18, Mar. 1956, p. 90-97.

Describes production of sandwich panels with unidirectional metal cores and panels of double curvature. Photographs, diagrams. (G general)

142-G. Stretch-Forming. *Aircraft Production,* v. 18, Mar. 1956, p. 106-111.

Description of the Hufford Carousel, a universal type of stretch-wrap forming machine which also does full-circle rotary forming, wipe forming, roll forming, reverse bends, joggling, stretch-levelling. Photographs, diagrams. (G9)

143-G. Machining Research. D. A. Oliver, T. S. Lister, M. D. Kinman and D. Fitzgeorge. *Aircraft Production,* v. 18, Mar. 1956, p. 118-124.

Mechanics of metalcutting and associated problems of temperature-rise and lubrication; machining problems in the aircraft industry; materials used in airframe manufacture; problems of machine tool design. Photograph, diagram, tables. 11 ref. (G17)

144-G. Save Four Ways: With Standardized Grinding Wheels. H. J. Prosser. *American Machinist,* v. 100, Feb. 27, 1956, p. 118-119.

How standardization of grinding wheels has been done and how it can be more widely applied. Photographs. (G18)

145-G. Epoxy Castings Replace Metal Forming Tools. Benjamin Sokol. *American Machinist,* v. 100, Feb. 27, 1956, p. 124-128.

Parting-agent problems that plague the epoxy-resin toolmaker are essentially solved by the use of a continuous film type of barrier coating. Tools and methods of fabrication outlined. Photographs, table. (G1)

146-G. Transfer Feeding Stampings. *Automation,* v. 3, Mar. 1956, p. 33-36.

Coil cradle, straightener, roll feed devices supply presses making refrigerator pans and shelves. Photographs, diagram. (G3)

147-G. Special Setup of Presses for Fender and Hood Production. Joseph Geschelin. *Automotive Industries,* v. 114, Mar. 1, 1956, p. 34-37, 90.

Extensive materials handling facilities at Chevrolet frame and stamping plant. Photographs. (G1, A5)

148-G. Automatic Control of Cutting Speed by the Temperature of the Cutting-Tool Edge. P. N. Malakhov. *Engineers' Digest,* v. 17, Jan. 1956, p. 13-14. (From *Vestnik Mashinostroyenya,* 1955, no. 4, Apr. 1955, p. 26-30.)

Previously abstracted from the original. See item 134-G, 1955. (G17, CI, ST)

149-G. Test Probe Limits of Controlled Shot Peening. Wesley W. Safee. *Iron Age,* v. 177, Mar. 1, 1956, p. 76-79.

Unanswered questions regarding effects of shot peening on fatigue life, and the "do's" and "don'ts" which permit more effective and more profitable operations. Graphs, table. (G23, Q7)

150-G. For Sheet Metal Fabricators —Cut Blanking Costs With Simplified Design. Frederico Strasser. *Iron Age,* v. 177, Mar. 15, 1956, p. 83-86.

Simple blank design provides a direct answer to how blanking costs can be effectively cut. Simplicity lowers tool costs, increases production, extends tool life. Diagrams. (G2)

151-G. Automated Stamping of Rear-Axle Housings. Charles H. Wick. *Machinery,* v. 62, Mar. 1956, p. 168-175.

Transfer presses with ingenious dies, automatic loading and unloading devices, interesting welding operations, latest type automation equipment lead to rapid, economical production. Photographs, diagrams. (G3, ST)

152-G. Rotary Cutters Used in Proto-Turning. *Machinery,* v. 62, Mar. 1956, p. 180-182.

Equipment and operations involved in production of odd-shaped aluminum parts in small quantities. Photographs. (G17, Al)

153-G. The Press Brake—Versatility Plus. Ernest C. Morse. *Modern Industrial Press,* v. 18, Feb. 1956, p. 24-26, 28.

Recent design improvements which increase versatility. Advantages and applications of press brake. Check list for prospective buyer. Photographs. (G3)

154-G. Techniques of Using Magnesium and Its Alloys in Sheet Form. R. G. Wilkinson. *Sheet Metal Industries,* v. 33, no. 346, Feb. 1956, p. 107-112; disc., 112-113.

Use of thick magnesium alloy sheet for aircraft parts usually made of aluminum. Methods of fabricating, advantages in weight and cost. Photographs, graph, diagram. (G4, T24, Mg)

155-G. Fuel-Tank Production at the Southall Works of A.E.C. Ltd. *Sheet Metal Industries,* v. 33, no. 346, Feb. 1956, p. 132-137.

Production of fuel tanks for commercial and passenger vehicles; a special-purpose press for an inverse flanging operation. Photographs, diagrams. (G1, A5, ST)

156-G. Shell Forming: Some Like It Hot, Some Like It Cold. Arthur F. MacConochie. *Steel,* v. 138, Feb. 27, 1956, p. 128-130, 132.

Comparison of cold forming and hot forging of ordnance shells. Features considered are lost steel, hot flow, cleanliness, work hardening, notch sensitivity, annealing, cold techniques, finishing. Hot-cupping, cold working process is suggested as best method. Diagrams, photograph. (G4, F22, ST)

157-G. Applying Cutting Fluids to Best Advantage. M. C. Shaw and P. A. Smith. *Tool Engineer,* v. 36, Mar. 1956, p. 111-115.

Methods and results of tests performed with cutting fluids in form of a flood of liquid and as a mist to determine relative efficiency of various methods of application. Graphs, diagram. (G21)

158-G. Diamond Tools Shape Small Parts. L. A. Hurwitz and R. A. Kurtz. *Tool Engineer,* v. 36, Mar. 1956, p. 116-119.

Selection, orientation, mounting, service life of diamond cutters; design of machines using diamond tools. Photographs. (G17)

159-G. Portable Tools in the Fabrication Shop. I. *Welding and Metal Fabrication,* v. 24, Feb. 1956, p. 40-44.

Review of modern portable tools, both electric and pneumatic, used in fabrication shops for grinding, sanding and polishing. Photographs. (G18, L10)

160-G. Soluble or Cutting Oil? *Automatic Machining,* v. 17, Mar. 1956, p. 39-42.

Advantages and disadvantages of each type and examples of applications for which each is best suited. (G21)

161-G. Cut Costs, Increase Production, by Platen Grinding With Abrasive Belts. John A. Simmons. *American Machinist,* v. 100, Mar. 26, 1956, p. 110-112.

A fast, efficient method of stock removal that gives a good finish on properly designed products and doesn't overheat the work. Table, photographs. (G18)

162-G. Fabrication of Zirconium Shells. II. R. S. French, C. H. Mayer and R. S. Pratt. *Bridgeport Brass Company, Bridgeport, Connecticut (U. S. Atomic Energy Commission),* SEP-149, March 1954, 35 p.

Metallurgical and mechanical property tests completed on two lots of alloy of the Zircalloy-I type and an additional lot of arc-melted sponge. Tables, graphs, micrographs, photographs. 8 ref. (G4, Q general, Zr)

163-G. The Machining Properties of Non-Ferrous Metals. D. F. Galloway. *Institute of Metals, Journal,* v. 84, Feb. 1956, p. 121-131 + 2 plates.

Techniques for solving machining problems and typical research results. Apparatus for measurement of cutting force and tool shape, factors influencing design of experiments. Graphs, diagrams, tables, photographs. (G17, Ni, Ti)

164-G. The Deep Drawing and Spinning of Sheet Metal, With Particular Reference to Non-Ferrous Materials. John A. Grainger. *Institute of Metals, Journal,* v. 84, Feb. 1956, p. 133-146 + 4 plates.

Recent developments in machines and methods, with particular attention to techniques such as marforming, hydroforming and flowturning, which provide inexpensive means of producing small quantities of parts. Lubrication discussed. Diagrams, graphs, tables, photographs. (G4, G13)

165-G. Rubber Pressing. J. Fielding. *Institute of Metals, Journal,* v. 84, Feb. 1956, p. 147-159 + 1 plate.

Methods and equipment for forming aluminum and magnesium alloys and titanium, details of hot-pressing techniques, with special reference to materials, temperatures, pressures and heat resisting rubbers. Tables, graphs, diagrams, photographs. 10 ref. (G8, Mg, Al, Ti)

166-G. How to Get More for Your Metalworking Dollar. II. How to Get More for Your Tooling Dollar. *Iron Age,* v. 177, Mar. 8, 1956, p. 153-184.

Contributions by the country's top tooling men, on metalworking problems and economics, range from the fundamentals of part design to the actual selection of equipment and accessories. The material is divided into two parts: tooling factors; and up-to-date editions of toolsteel charts. Photographs, tables. (G general, T6, TS)

167-G. (Czech.) **Importance of Cold Pressing as a Method for Manufacturing Screws and Bolts.** Karel Cerny. *Hutnik,* v. 5, no. 11, Nov. 1955, p. 337-340.

Techniques and machines for new method of making bolts and its economy compared with older machining methods. Diagrams, graph, photograph. 3 ref. (G1)

168-G. (Czech.) **Broaching and the Manufacture of Broaches.** J. Kryslicka. *Strojirenska Vyroba,* v. 3, no. 11, Nov. 1955, p. 456-457.

Materials, design, methods of preparation and operational features. Photographs. (G17, TS)

169-G. (French.) **Relationship Between Hardness and Extrusion Effort in the Impact Extrusion of Light Metals.** Robert Chopin and Jacques Chopin. *Revue de l'Aluminium,* v. 32, no. 227, Dec. 1955, p. 1150-1154.

Strain gage measurements of pressures exerted on a punch at the time of the extrusion show the extrusion capacity of a press by reference to its checked performance on 99.5% aluminium. Tables, graphs, diagrams. (G5, Q29, Q25, Al)

170-G. (Italian.) **Pressworking of Light-Alloy Containers.** A. Rossi. *Alluminio,* v. 25, no. 1, Jan. 1956, p. 5-11; disc., p. 12.

Illustrates various production methods such as deep-drawing, extrusion, ironing and the Keller-method. Fabrication processes for milk cans, gas cylinders, kitchen utensils for electric stoves. Diagrams, photographs, table. (G1, Al)

171-G. (Russian.) **Machinability of Stainless Steel.** Ia. Kh. Kostiukov. *Vestnik mashinostroeniia,* v. 36, no. 1, Jan. 1956, p. 38-42.

Properties of steel to be machined, machine tools and equipment used; choice of optimum geometry of cutter; deformation of layer subjected to cutting, and of machined surface; cutting speed permitted by a given cutting tool. Graphs, table. 2 ref. (G17, SS)

172-G. (Russian.) **Cold Stamping of Steel Parts.** V. A. Popov and A. N. Mit'kin. *Vestnik mashinostroeniia,* v. 36, no. 1, Jan. 1956, p. 50-54.

Stamping forces and other elements of stamping process analyzed. Design and materials in stamp dies; strength and quality of surface of the stamped parts. Diagrams, photographs, graph, table. (G3, ST)

173-G. (German.) **Electro-Erosive Machining of Metals.** H. Opitz. *Schweizer Archiv für Angewandte Wissenschaft und Technik,* v. 22, no. 2, Feb. 1956, p. 41-47.

Process, machinery, effectiveness, exactness and possibilities. Graphs, diagrams, photographs, oscillograms. 3 ref. (G17)

174-G. (German.) **Effect of Heat Treatment on the Machinability in Turning and Drilling of Plain Carbon Steel Containing About 0.45% C With Due Consideration of the Steel Melting Methods Used.** Egon Koerfer, Hermann Schenck and Hans-Kurt Görlich. *Stahl und Eisen,* v. 76, no. 3, Feb. 9, 1956, p. 125-133.

Investigations were made with bars of openhearth, electric furnace, improved converter and basic converter steels. Diagrams, micrographs, graphs, tables. (G17, J general, ST)

175-G. How to Understand Spark Erosion. R. Decat. *American Machinist,* v. 100, Apr. 23, 1956, p. 113-118.

Electronic-erosion equipment and techniques as a solution to cutting harder and tougher materials. Diagrams, photographs. (G17)

176-G. Get Rid of Kinks by New Tube-Forming Methods. W. G. Pat-

ton. *Iron Age,* v. 177, Apr. 19, 1956, p. 95-98.

Hydraulically operated expanding mandrels hug inside walls of rectangular tubes throughout bending operations, leaving no room for kinks. Photographs. (G6)

177-G. Design Dies Today, Start Stamping Tomorrow. C. B. Moore. *Iron Age,* v. 177, Apr. 19, 1956, p. 99-102.

Cookie-cutter-type dies are quickly built and provide a low cost method to produce stamped parts involving normal tolerances. Table, photographs. (G3)

178-G. Investigations Into Blade Root Fixings of High-Temperature Steels. W. Siegfried. *Sulzer Technical Review,* v. 37, no. 3, 1955, p. 34-52.

The choice of metals and structural designs for components subjected to high temperatures and stresses, especially for the blade roots of gas turbines. Diagrams, graphs, photographs, tables. 3 ref. (G17, T25, ST)

179-G. Fabrication of Zirconium Shells. R. S. French, C. H. Mayer and R. S. Pratt. *Bridgeport Brass Company (U. S. Atomic Energy Commission),* SEP-127, Dec. 1952, 43 p.

Deep drawing test results for cupping, folding and ironing indicate that the metal can be readily cold formed to fairly large reductions in diameter. Photographs, micrographs, graphs, tables. 7 ref. (G4, Zr)

180-G. (English.) On the Surface Roughness in Grinding. Kenji Sato. *Technology Reports, Tohoku University,* v. 20, no. 1, 1955, p. 59-70.

An analytical formula for the surface roughness in grinding effects of grinding wheels and operating conditions. Diagrams, photograph, tables, graphs. 7 ref. (G18, S15)

181-G. (German.) Deep Etching Instead of Milling. *Aluminium,* v. 32, no. 4, Apr. 1956, p. 214-216.

Parts of surface not to be etched are masked with a coating which resists the etchant, and the whole component is immersed in etching solution. Diagrams, photographs, micrographs. (G17)

182-G. (Russian.) Machining Various Materials by Means of Ultrasonic Vibrations. I. V. Metelkin, V. E. Popov, V. I. Nikol'skii, V. V. Metelkin and N. A. Mukaseev. *Stanki i Instrument,* v. 27, no. 2, Feb. 1956, p. 16-19.

Three types of ultrasonics: electrodynamic (up to 20 kc.), magnetostrictive (15 to 150 kc.), prezoelectrical (over 150 kc.). Speed and behavior of liquids and particles vibrated by ultrasonics, types of apparatus used, cone and exponential transformers, effect of size of abrasive grain. Photographs, graphs, table, diagrams. (G17)

183-G. (Russian.) Procedures of Underwater Gasoline-Oxygen Cutting of Steel. V. M. Agapov. *Svarochnoe Proizvodstvo,* 1956, no. 3, Mar. 1956, p 25-26.

Performance ratings of an underwater cutting device operating on a mixture of gasoline and oxygen. Compares tests and laboratory data with actual performance. Tables, graphs. 4 ref. (G22, ST)

184-G. Research Into Some Metal-Forming and Shaping Operations. W. Johnson. *Institute of Metals, Journal,* v. 84, Mar. 1956, p. 165-179.

Investigations into the drawing and redrawing of cylindrical shells with hemispherical and flat-headed punches, with particular reference to the effects of lubrication, drawing speed and flange wrinkling; ironing, tube-sinking, detection and measurement of residual stresses in cold drawn tubes, impact extrusion under a drop hammer, coining. Diagrams, graphs, table. 14 ref. (G general)

185-G. Cold Roll-Forming and Manipulation of Light-Gauge Sections. E. Griffin. *Institute of Metals, Journal,* v. 84, Mar. 1956, p. 181-197.

Advantages of cold forming for producing sections of complicated profile from strip in large quantity. Types of machines used and their capacities, calculation of power requirements, design and manufacture of roll-forming tools. The operation of cold roll forming machines; use of press brakes for forming simple sections. Diagrams, graphs, tables. (G11)

186-G. Stretch-Forming of Non-Ferrous Metals. R. D. Edwards. *Institute of Metals, Journal,* v. 84, Mar. 1956, p. 199-209.

Limitations of method; effects of heat treatment and differential work-hardening; type of stretch-forming and stretch-wrapping machines; design of and materials for tools. Diagrams, graphs. 15 ref. (G9, J general)

187-G. Bending and Allied Forming Operations. T. G. Perry. *Institute of Metals, Journal,* v. 84, Mar. 1956, p. 211-216.

Metallurgical factors involved in plain bending, tube bending, flanging and rolling. The concept of the

strain-hardening exponent used to provide empirical relationships for rolling machine capacities and for buckling criteria in bending. Graph, table. 8 ref. (G6)

188-G. Fundamentals of Electrical Discharge Machining. *Machinery,* v. 62, May 1956, p. 139-145.

Fundamental information about the electrical discharge process, based on translations of Russian technical papers and operations being performed at various industrial plants in the U.S.S.R. Diagrams, graphs, tables. (G17)

189-G. Know Your Cutting Fluids. R. K. Gould and R. C. Givens. *Machinery,* v. 62, May 1956, p. 150-154.

Action of cutting fluids, examines complex role assigned to these petroleum products. Photographs. (G21)

190-G. Working Today's Metals. I. Hot Rubber Pressing Forms Titanium Sheet. J. Fielding. *Metalworking Production,* v. 100, Apr. 13, 1956, p. 325-328.

Experiments to assess formability by rubber pressing on sheet material of Ti-75A (American) and of Ti-130 (British). Tables, photograph. (G8, Ti)

191-G. Research Throws Light on Machining Nimonic and Titanium. D. F. Galloway. *Metalworking Production,* v. 100, Apr. 13, 1956, p. 328-331.

Torque and thrust exerted when drilling groups of nonferrous and ferrous materials are compared. Relationships between tool life, cutting speed, feed rate. Graphs, diagrams, photographs, table. (G17, Tl, Ni)

192-G. Limited-Quantity Production of Stampings. Federico Strasser. *Sheet Metal Industries,* v. 33, no. 347, Mar. 1956, p. 179-182.

Details of tooling to effect cost economy when producing relatively small batches of parts. Diagrams. (G3)

193-G. (Polish.) **Production of Deep Drawing Steel Sheets.** Z. Wusatowski and R. O'Donnel. *Prace Instytutow Ministerstwa Hutnictwa,* v. 8, no. 1, 1956, p. 27-39.

Properties which distinguish auto body sheets of good quality; factors which influence these properties; special reference to production technology of steel sheets. Tables, micrographs, diagrams. 16 ref. (G4, F23, ST)

194-G. (Russian.) **Effect of Chemical Composition and Microstructure on the Machinability of Chromium Cast Irons.** M. M. Levitan. *Metallovedenie i Obrabotka Metallov,* 1956, no. 2, Feb. 1956, p. 50-52.

Effect of annealing and other heat treatment variations on hardness. Effect of carbon content. X-ray study of carbides. Graphs, tables, micrographs. (G17, Q29, J23, M27, CI)

195-G. How Versatile Is Your Punch Press Operation? Gilbert C. Close. *Finish,* v. 13, May, 1956, p. 33-36.

Details of the versatility of the shop press; its range of possible operations and example of economies possible. Photographs. (G2)

196-G. Are Poor Bends Draining Your Stamping Profits? Federico Strasser. *Iron Age,* v. 177, May, 3, 1956, p. 100-103.

Stampers and designers can apply the basics of bending with success. Shop tested, they reflect advanced thinking on trouble-shooting approaches most likely to hold stamping costs down to a competitive level. Diagrams, tables. (G3)

197-G. Precision Slicer Shaves Metal Waste. *Iron Age,* v. 177, May 3, 1956, p. 106.

Unit is an automatic hydraulically actuated, circular sawing device, employing a thin, circular diamond saw blade. Rates as low as 1/16 ipm. are possible. Photograph. (G17, Ge)

198-G. Cutting Fluids. *Lubrication,* v. 42, Apr. 1956, p. 49-60.

Various types of cutting fluids, their application and properties. Practical considerations on the care and handling of soluble oils. Diagram, photographs, tables. (G21)

199-G. Working Today's Metals. II. Lubricant Is Important in Deep Drawing Nimonic 75. John A. Grainger. *Metalworking Production,* v. 100, Apr. 20, 1956, p. 370-372.

Studies were made to determine what reductions in diameter are possible with Nimonic 75 sheet. Producing parts in this high-strength material by clamp-plate blankholding on a single-action press. Graphs, photographs, table. 13 ref. (G4, Ni)

200-G. How to Select Steels for Best Machinability. Howard E. Boyer. *Modern Machine Shop,* v. 28, May, 1956, p. 162 + 6 pages.

Machining properties of steel and how to achieve better machining characteristics by the route of material selection. (G17, ST)

201-G. How to Draw Titanium. *Steel,* v. 138, May 7, 1956, p. 98-99.

Application, drawability, method, dies, relief, lubrication and final operations. Photographs, diagrams. (G4, Ti)

202-G. The Abrasive Belt and Its Use in Machine Tools. J. K. McLaughlin. *Tool Engineer,* v. 36, May, 1956, p. 88-94.

Over 60 examples of application for this rapidly expanding technique are illustrated. Diagrams, photographs. (G18)

203-G. Soluble Oils. R. K. Gould and R. C. Givens. *Tool Engineer,* v. 36. May, 1956, p. 104-106.

Story of soluble cutting oils, including their composition, handling in storage, preparation of emulsions and factors affecting performance. (G21)

204-G. Contour-Etching. *Aircraft Production,* v. 18, May 1956, p. 168-176.

A process for forming aluminum alloys consists of removing metal from delineated areas by immersing the part in a sodium hydroxide solution. Table, diagrams, photographs. (G general, Al)

205-G. Cold Extrusion Improves Small Parts. George H. De Groat. *American Machinist,* v. 100, May 7, 1956, p. 156-157.

Wristpin production is an outstanding example of what can be done with cold extrusion. Changeover from machining has resulted in stronger, better parts and higher production rates. Diagrams, photographs. (G5)

206-G. The Relation Between Grinding Conditions and Thermal Damage in the Workpiece. R. S. Hahn. *ASME, Transactions,* v. 78, May 1956, p. 807-811; disc., p. 811-812.

Effect of variables such as work speed, feed and wheel characteristics on the instantaneous surface temperature produced and the resulting damage and stress. Diagram, micrographs, graphs. 9 ref. (G18)

207-G. The Role of Chip Thickness in Grinding. G. S. Reichenbach, J. E. Mayer, S. Kalpakcioglu and M. C. Shaw. *ASME, Transactions,* v. 78, May 1956, p. 847-857; disc., p. 857-859.

Mathematical analysis of chip thickness as a grinding parameter. Photograph, diagrams, tables, graphs. 15 ref. (G18)

208-G. Inorganic Grinding Fluids for Titanium Alloys. M. C. Shaw and C. T. Yang. *ASME, Transactions,* v. 78, May 1956, p. 861-867; disc., p. 867-868.

Dilute aqueous solutions of certain inorganic salts are very effective in decreasing the rate of grinding-wheel wear and providing decreased surface roughness in the finishing of titanium-alloy surfaces. Diagrams, tables. 4 ref. (G21, G18, Ti)

209-G. The Effect of High-Frequency Vibrations in Grinding. L. V. Colwell. *ASME, Transactions,* v. 78, May 1956, p. 837-844; disc., p. 844-846.

Small vibrations at high frequencies can improve surface finish, reduce temperature in the ground surface, reduce incidence of thermal cracks, and minimize the effects of variations in hardness within a grinding wheel. Diagram, graphs, micrographs, photographs, table. 3 ref. (G18)

210-G. Fabrication of Low-Nickel, High-Manganese Stainless Steels. Richard E. Paret. *Metal Progress,* v. 69, May 1956, p. 54-57.

New series 200 stainless steels can be formed and welded with the same dies, equipment and techniques now used for the higher nickel stainless steels. Greater strength of the new alloys may require some modification in tooling for embossing or extremely precise deep drawing because of a slight increase in springback. Graph, photographs, table. (G general, K general, SS)

211-G. (French.) Some Physico-Chemical Aspects of Oxygen Cutting. I. Claude Decroly and Guy Genin. *Revue de la Soudure (Brussels)* v. 12, no. 1, Jan. 1956, p. 50-70.

Thermal behavior of hollow cylindrical test pieces in technically pure oxygen; influence of impurities contained in the oxygen on the apparent inflammation temperature; thermal behavior of soft steel test pieces. Diagrams, graphs, tables. (To be continued.) (G22, CN)

212-G. (German.) Machining of Aluminium. P. Krekel. *Aluminium (Budapest)* v. 32, no. 5, May 1956, p. 276-282.

Describes best machine tools, forms of tool and tool materials, best cutting speeds and feeds and lubricants and coolants. Tables, graph, diagrams. 2 ref. (G17, Al)

213-G. (German.) Studies on Flame-Cutting Procedure. K. Teske. *Schweissen und Schneiden,* v. 8, no. 4, Apr. 1956, p. 122-129.

Slag temperature, ignition temperature, phase diagram of iron and its oxides, reaction speed. Graphs, diagrams, photographs. 2 ref. (G22, ST)

214-G. (German.) Present State of Our Knowledge in the Field of the Machinability of Iron and Steel. Franz Rapatz and Franz Motalik. *Stahl und Eisen,* v. 76, no. 8, Apr. 19, 1956, p. 477-485.

Considers wear, surface finish, tool life, structure, strength and sul-

fur and lead content in relation to machinability. Tables, diagrams, graphs. 64 ref. (G17, Fe, ST)

215-G. (Russian.) Vibration Machining of Plastic Materials. D. I. Shil'krut. *Doklady Akademii Nauk SSSR,* v. 107, no. 2, Mar. 11, 1956, p. 255-257.

Use of ultrasonic vibration to cut wood and steel. Longitudinal sections are cut from a taut steel wire without its breaking, thus showing how minimal cutting stresses are. Surface of cut is smooth. Photographs. 7 ref. (G17, ST)

216-G. (Russian.) Rolling of Balls. S. P. Granovskii, B. I. Efanov and A. A. Gromov. *Stal,* v. 16, no. 4, Apr. 1956. p. 333-337.

Advantages of new method of rolling steel balls for grind mills and for bearings over the customary stamping and forging methods. Technology of the new method. Photographs, diagrams, tables. (G11, ST)

217-G. The Formability of Aluminium Alloys. D. A. Barlow. *Engineering,* v. 181, May 18, 1956, p. 366-368.

Bending of tubes, solid sections and various shapes. Deep drawing failures; desirable characteristics for metals for deep-draw forming. Diagrams, photograph, graphs, table. 6 ref. (To be continued.) (G6, G4, Al)

218-G. Coolant Switch Increases Machining Speeds, Tool Life. Carl Seaburg. *Iron Age,* v. 177, May 31, 1956, p. 62-63.

Methods and advantages in use of synthetic cutting fluid. Photographs. (G21, G17, ST)

219-G. Wear Analysis of Hard Metal Turning Tools by Means of Radioisotopes. H. Opitz and O. Hake. *Microtecnic (English Edition),* v. 10, no. 1, 1956, p. 5-9; disc. p. 9.

Measurement of radioactive wear makes it possible to obtain absolute data as to machinability and to draw up machinability graphs. Diagrams, graphs, tables, photograph. 4 ref. (G17, Q9, TS)

220-G. Metal Working With Stock Removal and Its Effect on the Condition of the Product. M. Pesante. *Microtecnic (English Ed.),* v. 10, no. 1, 1956, p. 26-30.

Effect of grinding operation on internal stresses, resistance to fatigue and improvement in surface finish. Graphs, micrographs, table. (G18, Q7, Q25, AY)

221-G. Causes and Control of Distortion During Machining of Aluminum-Alloy Forgings. Loyl R. Thomas and Harry J. Gilliland. *Steel Processing,* v. 42, May 1956, p. 274-278, 287.

For maximum relief of stress, spars should be specially saw cut by the supplier after forging and prior to solution heat treatment. Tables, diagrams, photographs. (G17, Al)

222-G. Stretch-Wrap Forming. Kingsley C. Drone. *Western Machinery and Steel World,* v. 47, May 1956, p. 78-83.

Basic information on 18-year old process; different machines and techniques illustrated. Table, graph, diagrams, photographs. (G9)

223-G. (German.) Deep Drawing of Metal Sheets. Erich Siebel and Walter Panknin. *Zeitschrift für Metallkunde,* v. 47, no. 4, Apr. 1956, p. 207-212.

Reactions and stresses occurring during deep drawing with punch and die; basis for evaluating the drawing processes currently used in the forming of sheet. "Marform" and "Hydroform" processes. Graphs, diagrams. 23 ref. (G4, G9)

224-G. (German.) Processes of Punching of Nonferrous Metals. Rudi Dies. *Zeitschrift für Metallkunde,* v. 47, no. 4, Apr. 1956, p. 212-217.

In the perforating of nonferrous metals, the influences exercised by the consistency of the punching material, the surface finish of the punch, by lubrication and clearance between punch and die, on the forces of withdrawing or stripping were determined. These forces are dependent on the ratio of punch diameter and sheet thickness. Graphs, diagram, photographs, oscillograms. 3 ref. (G2, EG-a)

225-G. (German.) Production of Light Metal Sheet Parts in Automotive Construction. Erich Dannehl. *Zeitschrift für Metallkunde,* v. 47, no. 4, Apr. 1956, p. 221-223.

The stretching process is particularly suitable for small batches of parts in the automotive industry. A specially developed light metal sheet alloy is used. Diagrams, photographs. (G9, T21, EG-a)

226-G. The Formability of Aluminium Alloys. D. A. Barlow. *Engineering,* v. 181, May 11, 1956, p. 329-332.

General analysis of forming by means of stretching, shrinking or compressing operations. Graph, diagrams. 7 ref. (To be continued.) (G general, Al)

227-G. A Tapping Test for Evaluating Cutting Fluids. C. D. Flem-

ming and L. H. Sudholz. *Lubrication Engineering,* v. 12, May-June 1956, p. 199-203.

Equipment, conditions and procedure; typical results obtained with both oils and emulsions; correlation of test with actual field performance. Graphs, tables, photographs. 2 ref. (G21)

228-G. **Machining Meehanite Castings.** E. W. Harding and E. M. Trent. *Machinery (London),* v. 88, May 25, 1956, p. 808-817.

Depth of cut has little influence on tool life; cutting speed is most important factor; casting design has direct bearing on machinability and performance of carbide tipped tools. Photographs, diagram, tables, graphs, micrographs. (G17, CI)

229-G. **The Drawing of Titanium.** James S. Kirkpatrick. *Magnesium,* May 1956, p. 2-7.

Methods used successfully with commercially pure metal and the new high-strength alloys. Photographs, diagrams. (G4, Ti)

230-G. **The Use of Die Retainers in Bending Operations.** W. M. Halliday. *Sheet Metal Industries,* v. 33, no. 349, May 1956, p. 295-298.

An efficient and inexpensive form of mechanical retainer. Diagrams. (G6)

231-G. **Problems Solved by Precision Production Grinding.** A. H. Dall. *Tool Engineer,* v. 36, June 1956, p. 76-79.

Grinding equipment, methods of grinding various metals and shapes. Photographs, diagrams. (G18)

232-G. **Tools and Methods for Forming Titanium.** James S. Kirkpatrick. *Tool Engineer,* v. 36, June 1956, p. 85-89.

Equipment and procedures for spinning, drawing and other forming methods. Photographs, diagrams. (G13, G4, Ti)

233-G. **Hot-Spinning Thick-Walled Cylinders Slashes Fabrication Costs.** Don A. Sweet. *Western Metals,* v. 14, May 1956, p. 60-61.

Equipment and methods for spinning aluminum and other metal shapes up to ¼ in. thick. Photographs. (G13, Al)

234-G. (Czech.) **Determining the Forces Acting in Cold Extrusion.** F. Hrazdil. *Strojirenstvi,* v. 6, no. 3, Mar. 1956, p. 180-184.

Methods of determining deformation forces: analysis of forces acting in the extruding process, comparison of results obtained by using various formulas. Graphs, diagrams, photographs. 1 ref. (G5)

235-G. **Bandsawing Titanium.** L. O. Montgomery and G. William Bauer. *American Machinist,* v. 100, June 4, 1956, p. 124-125.

New setup method and revised tooth grind for standard blades improve cutting efficiency and indicate further possible improvements. Photographs, diagrams. (G17, Ti)

236-G. **Five Faults in Wet Abrasive Cut-Off and How to Correct Them.** P. C. Dooley. *American Machinist,* v. 100, June 4, 1956, p. 130-133.

Mechanics of wheel-face breakdown; methods of coolant application; causes and cures for wheel drift, heavy burr, burning the work, step cut and chamfer at top. Diagrams. (G17)

237-G. **The Formability of Aluminium Alloys.** D. A. Barlow. *Engineering,* v. 181, May 1956, p. 393-396.

Calculation of deep-drawing properties, forming limits, blank holder load and friction, ironing. Diagrams, graph, tables. 9 ref. (G4, Q23, Al)

238-G. **Machining Metals by Electro-Erosion.** W. Ullman. *Industrial Diamond Review,* v. 16, May 1956, p. 85-88, 90.

The arc, trigger, oscillator circuit, and Agietron methods of electro-erosion. Diagrams, graphs. (G17)

239-G. **Electrolytic Grinding.** G. Koscholke. *Industrial Diamond Review,* v. 16, May 1956, p. 90-92.

Surface material may be removed from a sintered carbide workpiece by the influence of an electric current. Diagrams, graph, photographs. micrographs. (G18, C-n)

240-G. **How and Where to Use Flame Gouging.** *Industry & Welding,* v. 29, June 1956, p. 52-54, 57.

Procedures, applications and equipment. Diagrams, photographs. (G22)

241-G. **Tips on Grinding and Buffing Stainless Welds.** Joseph J. Saber. *Industry & Welding,* v. 29, June 1956, p. 76-78.

Finishing techniques and factors determining final finish. Photographs. (G18, L10, SS)

242-G. **Tryout Press Puts Squeeze on Downtime.** W. G. Patton. *Iron Age,* v. 177, June 14, 1956, p. 95-97.

A 150-ton hydraulic press solves the problem of production die try-

out without interfering with production. By holding shop downtime to a minimum, it has more than paid for itself in a year. Photographs. (G1)

243-G. How to Choose the Best Drawing Lubricant. E. L. H. Bastian. *Iron Age,* v. 177, June 14, 1956, p. 102-104.

Problem of finding the best lubricant for a particular metal and a particular job is solved by grouping lubricants into three basic classes. Table, photograph. (G21)

244-G. Low-Cost Techniques Simplify Special Bends in Stamping. Federico Strasser. *Iron Age,* v. 177, June 7, 1956, p. 124-126.

Formulas, hints and alternate methods for the solution of almost any special bending problem. Diagrams. (G3, G6)

245-G. Standard Tooling Forms Titanium Wheels. W. L. Cameron and C. H. Savery. *Iron Age,* v. 177, June 14, 1956, p. 100-101.

A special government order for 12 truck wheels is filled by their fabrication on a standard set-up for steel. Diagram, photographs. (G general, T21, Ti)

246-G. Roll Grinding and Roll Grinding Wheel Application. William Pope. *Iron and Steel Engineer,* v. 33, May 1956, p. 125-128; disc., p. 128-129.

Machines, grinding fluids and compounds, wheel trueing and dressing and wheel selection for specific applications. Photograph. (G18)

247-G. The Big Step From Manual to Semi-Automatic Flame-Cutting. *Welding Engineer,* v. 41, June 1956, p. 35-36.

Machine increases production speeds by 75 to 200% and maintains great accuracy and economy. Photographs. (G22)

248-G. (German.) **Shielded Arc Cutting of Aluminum.** K. Domke. *Aluminium,* v. 36, no. 6, June 1956, p. 344-347.

Two new processes, one using a consumable steel rod electrode and the second a nonconsumable tungsten electrode. Numerical data concerning the current strengths and voltages for various cutting speeds, and gas consumption. Photographs, graph, diagrams, tables. 3 ref. (G22, A1)

249-G. (Russian.) **Study of the Temperature of the Vapor Phase Arising During the Electrospark Machining of Metals.** L. S. Palatnik and A. N. Liulichev. *Zhurnal Tekhnicheskoi Fiziki,* v. 26, no. 4, Apr. 1956, p. 832-838.

Method of measuring spark temperature. Temperature of spark between iron electrodes in relation to electrode diameter, current and electrode material. Graphs, tables, spectrograms. 21 ref. (G17)

250-G. (Russian.) **Use of Spectral Analysis for the Study of the Vapor Phase Arising During the Electrospark Machining of Metals.** L. S. Palatnik and A. N. Liulichev. *Zhurnal Tekhnicheskoi Fiziki,* v. 26, no. 4, Apr. 1956, p. 839-849.

Effect of material, polarity, shape and porosity of metal electrodes. Selective evaporation. Electrospark machining of various metals, using graphite electrodes. Effect of length of time and procedures. Spectrograms. 21 ref. (G17, S11)

251-G. Productivity by Oxygen Cutting. E. Seymour-Semper. *British Welding Journal,* v. 3, June 1956, p. 226-233.

Advantages over mechanical methods of plate edge preparation, general factors in productivity, multiple cutting, electronic control. (G22)

252-G. Built-Up Segmental Press Tools. *Mechanical World and Engineering Record,* v. 136, June 1956, p. 261-263.

Features accurate surface grinding. Each segment is preferably made exactly to size rather than to the small amount of available tolerance. (G18)

253-G. Deep Hole Drilling. II. E. Dinglinger and P. Grodzinski. *Mechanical World and Engineering Record,* v. 136, June 1956, p. 268-273.

Single-edged tool offers suitable conditions for application of sintered carbide to the drilling of deep holes. (G17, C-n)

254-G. How To Tool With Plastics. II. Guessing Is Gone From Toolmaking With Plastics. *Metalworking Production,* v. 100, June 1, 1956, p. 656-660.

Combining a laminated face with a cast core provides advantages of both techniques and produces a tool with a strong, tough surface while the large core area is quickly filled with the cast material. (G2)

255-G. Dieing Presses. Some Comments on Their Application and Tooling Techniques. I. Press Applications. II. Tool Design for Dieing Presses. S. C. Gillbanks and J. Galway. *Sheet Metal Industries,* v. 33, no. 350, June 1956, p. 359-367; disc., p. 367-369.

Examples of improved output resulting from efficiently designed dieing presses and tooling. (G1)

256-G. **Press Brakes and Their Tools. IV.** John Waller. *Sheet Metal Industries,* v. 33, no. 350, June 1956, p. 371-374, 419.

Use of a press brake to form awkward articles which are difficult to handle on an orthodox press. (To be continued.) (G1)

257-G. **Mechanization in General-Line Tin-Box Making.** John W. Langton. *Sheet Metal Industries,* v. 33, no. 350, June 1956, p. 375-378, 418.

Review of the progress of mechanization. Discusses round and rectangular seamless boxes and circular make-up containers. (G general, T10, Sn)

258-G. **Forming With Epoxy-Faced Dies.** John Delmonte. *Tool Engineer,* v. 37, July 1956, p. 84-86.

Successful forming and drawing of sheet metal by plastic-faced metal dies has demonstrated the remarkable durability and versatility of this application of epoxy resins. (G2, G4)

259-G. **Automation and Conveyors Cut Stamping Costs at Ford.** Arthur H. Allen. *Tool Engineer,* v. 37, July 1956, p. 98-101.

Press installations, press line automation, welding and assembly operations. (G3, A5, K general)

260-G. **Tape Control for Jig Boring Holds Production Promise.** J. J. Jaeger. *Tool Engineer,* v. 37, July 1956, p. 102-107.

Application of numerical control to the jig borer makes economic production of short runs of precision parts possible without elaborate setups and extensive tooling. (G17, S18)

261-G. (Czech.) **Electro-Erosive Machining of Metals.** Vl. Hermoch. *Elektrotechnika,* v. 21, no. 1, Jan. 1956, p.12-15.

Electro-erosion includes anode-mechanical machining and electrode-spark machining: principles and procedures. (G17)

262-G. (Czech.) **Machinability of Steel.** A. Vendr and M. Mikovec. *Strojirenstvi,* v. 6, no. 2, Feb. 1956, p. 103-110.

Machinability in relation to cutting speeds, resistances and quality of surface. Testing methods, effect of chemical composition and structure. Czech and foreign steels compared. (G17, CN, AY)

263-G. (Russian.) **Methods of Fire Trimming Metals.** M. S. Shlionskii. *Stal',* v. 16, no. 5, May 1956, p. 446-449.

Metal trimming procedures with gas and oxygen shears. (G22)

264-G. **How Tool Design Affects Cutting Forces.** Joseph C. Kozacka. *American Machinist,* v. 100, July 2, 1956, p. 85-87.

Dynamometer tests show that each component of the cutting force is increased by use of negative rakes. Direction of grinding marks and design of chipbreakers are also factors. (G17)

265-G. **Centralized Coolant Filtration: Cuts Tool Cost; Increases Production 15%.** Howard D. Klitgord. *American Machinist,* v. 100, July 2, 1956, p. 88-91.

Used on cutting fluid for turret lathes and automatic screw machines, this system removes particles under 25 mu. in., thus minimizing edge buildup and abrasion. (G17, G21)

266-G. **Bacterial Inhibitors for Cutting Oil.** H. O. Wheeler and E. O. Bennett. *Applied Microbiology,* v. 4, May 1956, p. 122-126.

Five compounds were found that completely inhibited all bacteria for 60 days under test conditions. A procedure is recommended for testing bacterial inhibitors in soluble oils. (G21)

267-G. **Study on High Speed Machining of Metal. II.** Hidehiko Takeyama and Eiji Usui. *Journal of Mechanical Laboratory (Japan),* v. 1, 1955, p. 20-21.

Two types of tool dynamometers for measurement of cutting force by magnetostriction phenomenon. (G17)

268-G. **Hot Forming Titanium.** Gilbert C. Close. *Light Metal Age,* v. 14, June 1956, p. 12-13, 29.

A case history dealing with use of resistance heating technique. (G1, G6, Ti)

269-G. **Form Tools by Electrical Discharge Machining.** N. P. Cici. *Machinery,* v. 62, July 1956, p. 148-153.

High-frequency discharges are directed from a negatively charged tool and through a dielectric fluid to the positively charged workpiece, removing metal by electro-erosion. (G17)

270-G. **Contour Rolling of Temperature Resistant Aircraft Components.** Frank J. Altmann. *Machinery,* v. 62, July 1956, p. 180-187.

Unique process for economically displacing metal to provide strong, light parts requiring practically no subsequent machining. All malleable structural metals can be contour rolled. (G11, G17)

271-G. Universal Die Cuts Cost of Impact Extruding at North American. Frank J. Pesak. *Machinery,* v. 62, July 1956, p. 194-200.

Various shaped parts can be produced by simply changing the punch die ring, stripper guide and knockout, thus reducing to a minimum the amount of tooling required for different extrusions. (G5)

272-G. Lubrication in Drawing. I. Failures and Causes. Eugene D. Viers. *Steel,* v. 139, July 9, 1956, p. 86-89.

Types of defects and their correction by lubrication. Photographs, micrograph. (To be continued.) (G21, G4)

273-G. Influence of Surface-Active Agents on the Dimensions of Chip Elements (in Cutting). G. I. Epifanov. *Henry Brutcher Translation No.* 3719, 6 p. (From *Doklady Akademii Nauk SSSR,* v. 104, no. 1, 1955, p. 68-71.) Henry Brutcher, Altadena, Calif.

Effect of various surface-active cutting fluids on size of individual slip elements of metal chips. Methyl alcohol, oleic acid, ethyl laurate and carbon tetrachloride were used. (G21, Al, Fe, Cu)

274-G. (English.) **Speed Effect on Metal Machining.** Hidehiko Takeyama, Terumi Murai and Eiji Usui. *Journal of Mechanical Laboratory (Japan),* v. 1, 1955, p. 59-61.

As the cutting speed increases, the chip thickness becomes thinner, the shear angle becomes larger, and the shearing fracture in the shear zone takes place more uniformly. (G17)

275-G. (French.) **Research on the Impact Extrusion Process.** Robert Chopin. *Revue de l'Aluminium,* v. 33, no. 231, Apr. 1956, p. 365-369.

The techniques have been carried out with a hydraulic press equipped to record, by an electric process, the pressure on the punch and deformation of the blank. Additional research, conducted with strain gages and an extra fast camera, has been devoted to the influence of the extrusion ratio, the thickness of the blank, and nature of the metal. (G5, Q25, Al)

276-G. (Pamphlet.) **Forming of Titanium and Titanium Alloys.** W. P. Achbach. v. I-II. *Battelle Memorial Institute, Titanium Metallurgical Laboratory Report No.* 42, May 1956, 248 and 194 p.

A survey of the airframe industry was made to determine the state of art of forming titanium sheet. Thirteen major forming methods evolved from the assembled information. (G general)

277-G. On the Tool-Life and Temperature Relationship in Metal Cutting. F. F. Ling and Edward Saibel. *ASME, Transactions,* v. 78, July 1956, p. 1113-1116; disc., p. 1116-1117.

Cutting-tool failure is viewed essentially as a rupture process and the data relating tool life and cutting temperature are interpreted from a reaction-rate theory point of view. (G17)

278-G. The Mechanism of Crater Wear of Cemented Carbide Tools. K. J. Trigger and B. T. Chao. *ASME, Transactions,* v. 78, July 1956, p. 1119-1126; disc., p. 1126.

Analysis of tool wear data in terms of fundamental variables consistent with the nature of the contact and rubbing of clean metallic surfaces. (G17, Q9, C-n)

279-G. Cleanliness, Flow Control Boost Coolant Efficiency. J. E. Hyler. *Iron Age,* v. 178, July 19, 1956, p. 112-114.

Coolant cleaners, refrigerators and special flow-control devices are worth-while aids to efficient, low-cost machining and grinding. Most are versatile, can be adapted to practically any type of metal cutting or grinding equipment. (G21)

280-G. Metal Cutting Measurements and Their Interpretation. E. G. Loewen and N. H. Cook. *Society for Experimental Stress Analysis, Proceedings,* v. 13, no. 2, 1956, p. 57-62.

Design of modified rings for use with electric resistance strain gages. Examples of the practical use of force measurements. (G17, Q25)

281-G. Lubrication in Drawing. II. Materials and Application. Eugene D. Viers. *Steel,* v. 139, July 16, 1956, p. 148-150, 152.

Single stage and multistage forming operations. Methods of applying lubricants. (G4, G21)

282-G. Tubular Fabrication. III. A. Scott. *Welding and Metal Fabrication,* v. 24, July 1956, p. 253-255.

Changing the contour of the tube, drilling, machining, milling and painting. (To be continued.) (G general, L26)

283-G. (Czech.) **Machining by Means of Ultrasonic Vibrations.** *Strojirenska Vyroba,* v. 4, no. 5, May 1956, p. 199-201.

Ultrasonic transducer for machining a variety of materials. Physical principle of magnetostriction, construction of a magnetostrictive vibrator. (G17)

284-G. (French.) **Studies on Estimating the Stamping Ability of Thin Sheets From Laboratory Tests.** M. Jentet. *Metallurgie,* v. 88, no. 5, May 1956, p. 479-489.

Compares various characteristics of a sheet, obtained by laboratory tests, with a simple stamping, and investigates, by studying the correlation between the results, the characteristic which best enables estimating the stamping ability of the sheet. (G3)

285-G. (German.) **Effect of Heat Treatment on the Machinability of Case Hardened and Improved Steel.** *Archiv für das Eisenhüttenwesen,* v. 27, no. 6, June 1956, p. 381-400.

Results of long-time torsion testing of two different melts of various alloy steels. Dependence of the tool life behavior and the realization of surface quality by heat treatment of the workpiece. (G17, J23, Q1, AY)

286-G. (Hungarian.) **Hot and Cold Working of "Nautal", With Special Consideration to the Resistance of Forming.** Zoltan Buray. *Kohaszati Lapok,* v. 9, no. 5, May 1956, p. 232-235.

Laboratory and pilot plant experiments led to the development of the Al-Mg 4.5-Mn 0.4 alloy designated as "Nautal". Hot and cold forming experiments. Rolling and deep drawing data. (G general, F23, Al)

287-G. **Steel Hardness Doesn't Bother the Friction Saw.** J. E. Hyler. *Iron Age,* v. 178, July 26, 1956, p. 72-74.

At high speeds, heat of friction softens a small area of the workpiece. Blade literally wipes this metal out of the cut, providing fast, efficient cutting. (G17, ST)

288-G. **Some Investigations Into the Deep Drawing and Spinning of Non-Ferrous Metals.** John A. Grainger. *Sheet Metal Industries,* v. 33, no. 351, July 1956, p. 461-473, 486.

Reference to a number of tests conducted on a cupping press to assess the efficiency of certain lubricant systems. (To be continued.) (G4, G13, G21, EG-a)

289-G. **Press Brakes and Their Tools. V.** John Waller. *Sheet Metal Industries,* v. 33, no. 351, July 1956, p. 475-478, 486.

Methods of piercing holes with standard unit tools. (To be continued.) (G2)

290-G. **The Design of Interchangeable Die Inserts for Universal Piercing Tools.** W. M. Halliday. *Sheet Metal Industries,* v. 33, no. 351, July 1956, p. 487-493, 500.

Various methods of constructing universal-type piercing tools. (G2)

291-G. **Success Out of Failure. III. Lubrication in Drawing.** Eugene D. Viers. *Steel,* v. 139, July 23, 1956, p. 94-96, 98.

Ten essentials of a drawing lubricant. (G4, G21)

292-G. **Rolling Mill for Roofs and Floors.** *Steel,* v. 139, July 30, 1956, p. 96-98.

Three cold roll-forming mills and a huge finishing machine feed a soaring market in cellular metal roof and floor sections. (G11)

293-G. **Rubber Forming Gains Accuracy.** *Steel,* v. 139, July 30, 1956, p. 109.

A variation of rubber forming called compression forming is producing more accurate parts for supersonic aircraft. Method utilizes the plastic range of metal grains to reduce springback. (G8, Al)

294-G. **Ceramic Tools in Production and in the Laboratory.** Robert T. Hook. *Tool Engineer,* v. 37, Aug. 1956, p. 101-104.

Characteristics of sintered aluminum oxide tools; rules developed from experimental and production experience. (G17)

295-G. **Tungsten Carbide Dies for Punching Armature Laminations.** W. A. Fletcher. *Tool Engineer,* v. 37, Aug. 1956, p. 78-81.

Production of laminations by steel and by carbide dies compared. (G2, C-n, W)

296-G. **Machine Tool Requirements of the Future.** Milton C. Shaw. *Tool Engineer,* v. 37, Aug. 1956, p. 105-111.

Machining cost, recent cutting tool developments, problems of increased speed and power, automatic control, nonchipforming processes. (G17)

297-G. **Grinding Tap and Die Chasers.** *Tool Engineer,* v. 37, Aug. 1956, p. 117-118.

Tables show recommended chamfer angles and chasing lubricants. (G18)

298-G. **Refinery Equipment Requires Quality Oxy-Acetylene Cuts for Weld Preparation.** C. B. Robinson. *Western Metals,* v. 14, July 1956, p. 52-54.

Fundamental requirements, basic cutting procedure, guide to proper cutting technique. (G22)

299-G. Break Production Records With Leaded Steels. T. M. Rohan. *Iron Age,* v. 178, Aug. 2, 1956, p. 83-85.

Leaded steels have extraordinary machining properties and contribute to over-all product quality improvement. (G17, Pb, ST)

300-G. Drawn Parts: Save Through Simplified Design. Federico Strasser. *Iron Age,* v. 178, Aug. 2, 1956, p. 88-91.

Some production-slanted tips aimed at overcoming some of the tougher drawing problems. (G4)

301-G. Metal Stampings. Federico Strasser. *Iron & Steel,* v. 29, July 1956, p. 343-347.

Some methods for saving material. (G3)

302-G. Dimpling Stainless-Steel Foil. J. E. Hagins. *Machinery,* v. 62, Aug. 1956, p. 156-158.

Rejects from cracks and wrinkles vanish and heat radiation factor is doubled. (G2, SS)

303-G. Hot Forming Titanium. L. Deane Noble. *Modern Machine Shop,* v. 29, Aug. 1956, p. 104-107.

Use of titanium in the manufacture of bomber outboard wing slats. (G1, Ti)

304-G. Essential Elements of Thread and Form Rolling. II. Clifford T. Appleton. *Modern Machine Shop,* v. 29, Aug. 1956, p. 110-117.

Types of equipment available for thread rolling. (To be continued.) (G12)

305-G. How We Grind Powdered Steel Gears to 4-6 Microinches. Arthur Roberts. *Precision Metal Molding,* v. 14, Aug. 1956, p. 59-60, 62, 64.

Some features of the grinding operations. (G18, G19, ST)

306-G. (French.) Some Physico-Chemical Aspects of Cutting With Oxygen. II. Claude Decroly and Guy Genin. *Revue de la soudure* (Brussels), v. 12, no. 2, Feb. 1956, p. 130-138.

Ignition temperature was only slightly affected by the rate of discharge of the oxygen, but was reduced by adding aluminum and iron. These agents make it possible to economize on oxygen. (G22, ST)

307-G. Machining Light-Alloys. *Aircraft Production,* v. 18, Aug. 1956, p. 318-324.

Applications of special cutting tools, progressive cut milling, profiling thin-wall tubes. (G17, T24, EG-a) 318-321.

308-G. Mechanism of Action of Active Agents in the Cutting of Metals. G. I. Epifanov, N. A. Pleteneva and P. A. Rebinder. *Henry Brutcher, Translation No.* 3424, 7 p. (From *Doklady Akademii Nauk SSSR,* v. 97, no. 2, 1954, p. 277-279.) Henry Brutcher, Altadena, Calif.

Disintegration as result of catalysis of decomposition of cutting agents by the metal, and diffusion of the decomposition products, particularly hydrogen, into metal lattice. (G21)

309-G. Machining Hard and Brittle Materials. R. C. Hall. *Metal Progress,* v. 70, Aug. 1956, p. 78-80.

Laboratory equipment necessary to cut or machine hard or brittle materials by the electric spark method is simple and inexpensive to build. Metal removal rate is low but the cut surface is free from burrs and strain. (G17)

310-G. Prediction of Drawing Properties From Tensile Tests. E. N. Ludington. *Metal Progress,* v. 70, Aug. 1956, p. 93-96.

The load required to draw cylindrical cups and the maximum reduction possible can be predicted quite accurately from the ultimate tensile properties of the original sheet. (G4, Q27)

311-G. Power Spinning Conical and Tubular Parts. *Product Engineering,* v. 27, Aug. 1956, p. 135-140.

Advantages and limitation over other metalworking processes. Applications, effect on strength, hardness and fatigue of metals, tolerances, finishes and tool costs. (G13)

312-G. Metal Flow-Turning. A Modern Development of an Historic Process. R. G. Longley and W. Hadley. *Sheet Metal Industries,* v. 33, no. 352, Aug. 1956, p. 519-529.

Process is similar to metal spinning but actually involving cold flow of the metal. (G13)

313-G. Spark-Machining Process and Some Typical Applications. J. L. Adcock. *Sheet Metal Industries,* v. 33, no. 352, Aug. 1956, p. 530-535; disc., p. 535-536.

Compares electrolytic, electro-arcing and electro-sparking processes. (G17)

314-G. Some Investigations Into the Deep Drawing and Spinning of Non-Ferrous Metals. John A. Grainger. *Sheet Metal Industries,* v. 33, no. 352, Aug. 1956, p. 537-545, 563.

Details of the marforming and hydroform processes. (G4, G13)

315-G. New Technique: Lead in Steel Forgings. *Steel,* v. 139, Aug. 13, 1956, p. 100-101.

Properties and advantages of leaded steel. Tool life is increased and machining simplified. (G17, Pb, AY)

316-G. Finish Grind With a Wet Belt. *Steel,* v. 139, Aug. 13, 1956, p. 114-115.

Construction and operation of pneumatic grinding fixture mounted on an automatic hydraulic in-feed. Greater flexibility, faster production and closer tolerances are advantages claimed over conventional grinding. (G18)

317-G. The Cold Forming of Aluminium Alloys. D. A. Barlow. *Welding and Metal Fabrication,* v. 24, Aug. 1956, p. 286-289.

Data showing the maximum amount of deformation of which a material is capable without failure for each type of forming operation and for each alloy and temper. (G general, Al)

318-G. (German.) **Effect of Cutting Conditions on the Surface Quality From an Economic Point of View.** Heinz Christoph. *Schweissen und Schneiden,* v. 8, no. 7, July 1956, p. 230-237.

Measuring equipment, conditions for constructive oxygen-cutting, standardization, influence of feed and of oxygen pressure, cost comparison. (G22)

319-G. Producing Magnesium Impact Extrusions. John Alico. *Light Metal Age,* v. 14, Aug. 1956, p. 20-23.

Impact extrusion methods, design consideration. (G5, Mg)

320-G. The Machinability of Steel Casting Surfaces. *Steel Founders' Society of America, Research Report No.* 37, Aug. 1956, 36 p.

Effect of heat treatment, welding practices and variations in casting and molding practices. (G17, J general, K general, E general, CI)

321-G. Tool Considerations in Forming the Austenitic Stainless Steels. Lester F. Spencer. *Steel Processing,* v. 42, Aug. 1956, p. 453-461, 474.

Characteristics of austenitic stainless steels, cold reduction effects, fabrication methods and steel tempers, die material considerations, surface finish of parts, available die materials other than tool steels. (G general, SS)

322-G. Flange Wrinkling in Deep-Drawing Operations. B. W. Senior. *Journal of the Mechanics and Physics of Solids,* v. 4, Aug. 1956, p. 235-246.

Critical dimensions and number of waves are predicted on the bases of the stress-strain curve of the material and the flange geometry. (G4, Q25)

323-G. Milling Steel. How to Get the Most From Carbide Cutters. F. W. Lucht. *Tool Engineer,* v. 37, Sept. 1956, p. 103-108.

Optimum performance is the result of correct tool, fixture and machine design, as well as using correct grades of carbides and recommended feeds and speeds. (G17)

324-G. (Book.) **Forming Magnesium.** 144 p. Dow Chemical Company, Midland, Mich.

Basic data on numerous forming methods; notes on selection of alloys, cleaning, assembly protection, and safety recommendations. (G general, Mg)

325-G. Cold Metal Extrusions. II. Edward S. Cornell, Jr. *Electronic Design,* v. 4, Sept. 1956, p. 32-35.

Mechanics of extrusions, pressures needed, contours, lubrication, die strength, principles. (G5)

326-G. Forming Sheet Metal Components for Aircraft. John F. Tyrrell. *Metal Progress,* v. 70, Sept. 1956, p. 110-112.

Some unique techniques for low-volume production have been developed to minimize retooling cost. (G general, SG-j)

327-G. What Is Ultrasonic Machining? E. A. Neppiras. *Metalworking Production,* v. 100, Aug. 17, 1956, p. 1283-1288.

Design principles, magnetostriction vibrators, three typical ultrasonic drills. (G17)

328-G. Report on Ultrasonic Machining. II. The Mechanism of Ultrasonic Drilling. E. A. Neppiras. *Metalworking Production,* v. 100, Aug. 24, 1956, p. 1333-1336.

Cavitation process. Simple, dynamic principles enabling prediction of effect of changes in principal variables on cutting speed. (G17)

329-G. How to Machine Superalloys. R. D. Halverstadt. *Metalworking Production,* v. 100, Aug. 24, 1956, p. 1341-1344.

Machinability data, tool geometry principles, selecting tool grade, correct cutting fluid. (G17, G21, SG-h)

330-G. A Study of Lubrication in Relation to Continuous Metal-Deformation Processes. L. H. Butler. *Sheet Metal Industries,* v. 33, no. 353, Sept. 1956, p. 647-654.

Mechanism of metallic contact dur-

ing continuous deformation. Limitations of various types of lubricants. (To be continued.) (G21)

331-G. Transverse Cracking Resulting From Oxygen Cutting. Norman N. Breyer. *Welding Journal,* v. 35, Sept. 1956, p. 865-876.

Application of general preheating is reported to reduce to an insignificant rare occurrence of transverse cracks on the casting side of a cast-armor, rolled-armor weld joint. (G22, AY)

332-G. Thermal Cutting of Aluminum, Stainless Steels, and High-Nickel Alloys. Edward H. Roper. *Welding Journal,* v. 35, Sept. 1956, p. 915-919; disc., p. 920.

Gas-shielded metal-arc process permits the cutting of numerous materials which cannot be readily severed by oxygen cutting. Process is capable of both manual and machine operation and produces cut surfaces suitable in the as-cut condition for further processing, such as welding. (G22, Al, SS, Ni)

333-G. Electrospark Process in the Manufacture of Carbide Dies for Wire Drawing. Z. Steininger. *Henry Brutcher Translation No.* 3604, 7 p. (From *Hutnik,* v. 22, no. 3, 1955, p. 87-89.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 178-G, 1955. (G17, L10, C-n)

334-G. Machinability of Free-Cutting Steels. H. Müller. *Henry Brutcher Translation No.* 3780, 18 p. (From *Stahl und Eisen,* v. 75, no. 18, 1955, p. 1171-1176.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original See item 290-G, 1955. (G17, ST)

335-G. (Russian.) **Machining Hard Alloy Microsections Without the Use of Diamonds.** I. K. Trushin. *Zavodskaia Laboratoriia,* v. 22, no. 7, July 1956, p. 810-811.

An electro-abrasive method consisting of electrochemical dissolving of the hard alloy and simultaneous removal of the dissolved products by electroconductive abrasive grains with a graphite filler. (G17, SG-j)

336-G. Arc-Cast Molybdenum. Robert R. Freeman and J. Z. Briggs. *American Machinist,* v. 100, Sept. 24, 1956, p. 149-156.

A summary of latest machining practice; three case studies on machining turbine wheels; tests of the metal as a boring-bar material. (G17, Mo)

337-G. Formability of Metals. Lester F. Spencer. *Finish,* v. 13, Oct. 1956, p. 23, 25-26.

Basic characteristics of metals, materials for cold forming, and divisions of cold forming methods are analyzed. (G general, Al, SS)

338-G. How Much Should a Weld be Peened to Obtain the Best Results With Regard to Deformation and Residual Welding Stresses? Rudolf Gunnert, Hans Alida and Lars Heiling. Paper from "International Institute of Welding Annual Meeting 1956, Madrid". American Welding Society, 13 p.

An energy of 600 kg. on the weld metal from one electrode was found to be satisfactory. (G23, K general)

339-G. Productivity by Oxygen Cutting. E. Seymour-Semper. Paper from "International Institute of Welding Annual Meeting 1956, Madrid", American Welding Society, 9 p.

Comparison with mechanical cutting as a method of plate edge preparation for welding. Use of multiple cutting machines for increased productivity. Electronic control. (G22)

340-G. (German.) **Oxy-Acetylene Cutting.** Valentin Trunschitz. *Schweisstechnik,* v. 10, no. 5, May 1956, p. 67-71.

Principles of cutting with gas and iron powder. Description, care and uses of groove-cutting torches. (G22)

341-G. Deep Drawing of Sheet Metal by Friction Forces. N. A. Maslennikov. *Engineers' Digest,* v. 17, Sept. 1956, p. 366-368. (From *Vestnik Mashinostroyeniya,* no. 5, May 1956, p. 59-63.)

Drawing ratio for aluminum alloys was increased from between 2.0 and 2.5 to between 6.5 and 7.0, while the number of drawing operations was reduced from 8 to 1. (G4, Al)

342-G. Relations Between the Fibrous Structures of Chips Formed in Machining as Determined by X-Ray Diffraction and the Mechanism of Deformation During Metal Cutting. P. Bastien and M. Weisz. *Microtecnic (English Ed.)* v. 10, no. 3, 1956, p. 122-130.

Mechanism of orientation by compression, phases of simple gliding and uniform compression, critical study of various suggested solutions. (G17, M22, Q24, ST, Fe)

343-G. Radial Draw Forming of Helicopter Components. L. Favreau. *Metal Progress,* v. 70, Oct. 1956, p. 88-91.

Radial draw forming equipment is sufficiently versatile that it can be used to fabricate inexpensively many of the complex shapes used in helicopters. (G9)

344-G. Power Spinning Conical and Tubular Parts. *Metalworking Production,* v. 100, Sept. 28, 1956, p. 1547-1553.

Advantages and limitations over other metalworking processes; applications; effect on strength, hardness and fatigue of metals; tolerances, finishes and tool costs.
(G13, Q23, Q29, Q7, Al, SS, ST)

345-G. (French.) **The "Arcair" Process.** G. Doneux. *Revue de la Soudure (Brussels),* v. 12, no. 3, 1956, p. 150-158.

Material is removed from carbon, stainless and refractory steels and nonferrous alloys by melting with an electric arc maintained with a carbon graphite electrode and blowing it away with compressed air. Technological study of the process and applications. (G22)

346-G. (Russian.) **The Effects of Cold Working on the Drawing Properties of Sheet Metal.** A. V. Altykis and L. A. Shofman. *Metallovedenie i Obrabotka Metallov,* no. 8, Aug. 1956, p. 37-42.

The stamping and deep drawing properties of sheet metals after cold working and after annealing. Comparison and application of the methods. (G3, G4, J23)

347-G. (Russian.) **The Effect of the Grinding Procedure on Development of Channels on Porous Chromium.** A. A. Mikhailov. *Vestnik Mashinostroeniia,* v. 36, no. 9, Sept. 1956, p. 52-56.

Experimental data on the influence of various factors in grinding metal parts prior to chromium plating on the extent of the channel network on the porous chromium coating. Number of channels increases with the force applied in the grinding. (G18, L17, Cr)

348-G. What Causes Grinding Stress? John Harrington. *American Machinist,* v. 100, Oct. 22, 1956, p. 124-126.

Causes and elimination of high temperatures generated at the workwheel point of contact which produce stresses of considerable magnitude. (G18, Q25)

349-G. The Scale Effect in the Cup Drawing Test. J. F. Wallace. *Iron and Steel Institute, Journal,* v. 184, Oct. 1956, p. 144-148.

Specification of the drawing performance of sheet metals by this test discussed with particular reference to cup diameter, sheet thickness and blankholder load. (G4)

350-G. Casting Factors Affecting Machinability of Gray Iron, Edward A. Loria. *Western Machinery and Steel World,* v. 47, Oct. 1956, p. 96-100.

Influence of pouring temperatures, mold conditions and inoculation practice on machinability.
(G17, E general, CI)

SECTION H

POWDER METALLURGY

1-H. Vibratory Compacting of Metal and Ceramic Powders. William C. Bell, Richard D. Dillender, Harold R. Lominac and Edward G. Manning. *American Ceramic Society, Journal,* v. 38, Nov. 1955, p. 396-404.

Investigation concerned with forming alumina, chromium-alumina and nickel-titanium carbide powders by low-frequency vibration. Table, graphs, diagram, photograph. (H14, Ti, Ni, Cr, Al)

2-H. (German.) **Preparation of Magnetic Materials by Powder Metallurgy.** Hermann Fahlenbrach and Hans Ringmann. *Elektrotechnische Zeitschrift,* v. 7, Ausgabe B, no. 10, Oct. 1955, p. 373-376.

Production methods, properties, applications of sintered metal powder permanent magnets. Table, graphs, photographs. (H general, SG-n)

3-H. (German.) **Boron-Containing Sinter-Alloy on Base of Iron.** F. Benesovsky, W. Hotop and F. Frehn. *Planseeberichte für Pulvermetallurgie,* v. 3, no. 2, Aug. 1955, p. 57-70.

Experiments with addition of boron to different alloys sintered under vacuum, based on experience obtained with boron addition to alloys in production of permanent magnet materials, resulting in increasing density. Tables, micrographs. 16 ref. (H12, H15, B. AY, SG-n)

4-H. Cermets. J. R. Baxter. *Australasian Engineer,* 1955, Sept., p. 45-50.

Reviews cermet development. Bond formation between metal and ceramic phases; effects of the distribution and form of the two phases on the properties of cermets. Graphs, micrographs, tables. 24 ref. (H general)

5-H. Uniform Density and Structure Possible With Simultaneous High Pressure and Temperature. R. Humphrey, M. Vilella and L. W. Tomarkin. *Journal of Metals,* v. 7, Nov. 1955, p. 1159-1161.

Summarizes interesting aspects of forming compounds, with many new properties, by the Vitron process. Photographs. (H14)

6-H. Fiber Metals: A New Metal Form. A. G. Metcalfe and C. H. Sump. *Materials & Methods,* v. 42, Nov. 1955, p. 96-98.

Introduction to the production, strength and applications of fiber metallurgy. Tables, photographs, micrograph, flowsheet. (H general, Fe)

7-H. Materials Engineering and File Facts. Standards, Specifications and References for Metal Powders and Metal Powder Products. *Materials & Methods,* v. 42, Nov. 1955, p. 137, 139, 141.

Cross references for data published by ASTM, MPA, SAE, and federal agencies, including military, with list of addresses. (H general, S22)

8-H. (Hungarian.) **Recent Problems of Hungarian Aluminum-Powder Production.** Miklos Hauska. *Kohaszati lapok,* v. 10, no. 10, Oct. 1955, p. 466-473.

Review of powder production abroad; history of production in Hungary and its obstacles; prerequisites for increasing production quality. (H10, Al)

9-H. (Russian.) **Compressibility of Boride, Carbide, and Nitride Powders of High-Melting Metals.** G. V. Samsonov and V. S. Neshpor. *Doklady akademii nauk SSR,* v. 104, no. 3, Sept. 21, 1955, p. 405-408.

The particles are almost free of oxide films which influence the electroconductivity of the powder and lower coefficient of friction between particles during pressing or compressing action. Measurement is made of electroconductivity

and relative volume. Brittleness factors, microhardness and character of crystal lattice. Graph, table. 7 ref. (H11, Ti, Zr, W)

10-H. A Method of Preparing Iron Powder for Permanent Magnets. E. H. Carman. *Metallurgia,* v. 52, no. 312, Oct. 1955, p. 165-168.

Apparatus for hydrogen reduction of small quantities of iron oxide at temperatures between 250 and 350° C. Diagram, graphs, micrographs, table. 3 ref. (H10, Fe)

11-H. Powder Metallurgy. T. Raine. *Metropolitan-Vickers, Research Series No.* 3, Apr. 1955, 19 p.

Discusses refractory metals, hard metals, sintered iron and steel products, current developments. Diagrams, graphs, micrographs, tables. 37 ref. (H general)

12-H. Preparation of Dense Beryllium Oxide. Collin Hyde, John F. Quirk and Winston H. Duckworth. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* BMI-1020, July 1955, 24 p.

Present research was aimed at developing an active, readily sinterable beryllium oxide powder and to determine some pertinent properties of densely sintered beryllium oxide compacts. Micrographs, graphs, tables. 7 ref. (H15, Q general, Be)

13-H. Characteristics of Copper-Infiltrated Porous Iron. J. E. Elliott. *Metallurgia,* v. 52, no. 313, Nov. 1955, p. 226-234.

Structural changes in the skeleton during infiltration explained in terms of alloying effects. Graphs, tables, maps. 5 ref. (H16, Fe)

14-H. (German.) **Hardenable Bronzes of Copper-Nickel-Tin Basis.** E. Fetz. *Metall,* v. 9, nos. 21-22, Nov. 1955, p. 960-966.

Investigates relation of sintered nickel-bronze composition to powder pressure, cooling time from alpha-phase region after diffusion sintering, pressing. Tables, graphs. 34 ref. (H14, H15, Cu)

15-H. Friction Materials—A New Field for Ceramics and Cermets. R. H. Herron. *American Ceramic Society Bulletin,* v. 34, Dec. 1955, p. 395-398.

Cermet materials have contributed greatly to aircraft brake problems and other less severe applications. Such materials may be the only answer to high-temperature seal and bearing problems. Graphs, photographs. (H general, SG-m)

16-H. Fundamental Study and Equipment for Sintering and Testing of Cermet Bodies: VII. Fabrication, Testing, and Properties of 34 Al_2O_3—66 Cr-Mo Cemets. Thomas S. Shevin and Charles A Hauck. *American Ceramic Society, Journal,* v. 38, Dec. 1955, p. 450-454.

Usefulness in high-stress service to 1800° F. is indicated by stress-rupture behavior, oxidation resistance and thermal-shock resistance. Photograph, graphs, micrograph. 2 ref. (H general, Q4, Al, Cr, Mo)

17-H. Hot Pressed Boron Nitride. K. M. Taylor. *Industrial and Engineering Chemistry,* vol. 47, Dec. 1955, p. 2506-2509.

Body tested resembles graphite in crystalline structure, machining and lubricating properties but differs in temperature strengths and electrical resistivity. Other properties noted. Photograph, graphs, tables. 4 ref. (H14, Q23, P15, B)

18-H. Iron Powder Parts Improved by Heat Treatment. F. L. Spangler. *Materials & Methods,* v. 42, Dec. 1955, p. 102-104.

Steam treatment and carburizing improve strength, corrosion resistance and appearance. Photographs. (H16, J general, Fe)

19-H. Powder Metallurgy Makes Better Reactor Fuels and Components. *Nucleonics,* v. 13, Dec. 1955, p. 24-26.

Techniques and advantages of powder metallurgy for reactor uses. Better resistance to radiation and applicability to unusual combinations are two main reasons for high interest in these methods. Micrographs, diagrams, table. 11 ref. (H general, T25, U, Th, Al)

20-H. (French.) **Sintering of Beryllium Powder.** A. Blainey, T. L. Johnston and J. W. S. Jones. *Revue de métallurgie,* v. 52, no. 9, Sept. 1955, p. 735-749.

Microstructure, mechanical properties and sintering characteristics of several types of powder compared. Graphs, micrographs, photograph, tables. 9 ref. (H10, H15, M27, Q general, Be)

21-H. (French.) **Thermionic Emission of Sintered Mixtures of Powdered Tungsten and Alkaline Earth Carbonates.** G. Mesnard and R. Uzan. *Vide,* v. 10, nos. 58-59, July-Sept. 1955, p. 105-118.

Preparation of cathodes formed with pressed and sintered mixtures; thermionic properties and chemical reactions between components; effects of carbon or nickel additions. Graphs. 4 ref. (H11, P15, W)

22-H. (Russian.) **Dilatometric Investigation of Contraction in Process of**

Sintering Powder Metals. V. N. Goncharova. *Metallovedenie i obrabotka metallov,* 1955, no. 3, Sept., p. 51-53.

Investigates linear contraction of the composition iron-graphite-copper during heating up to 1050 to 1070° C. at a rate 200° C. per hr., and cooling in the same furnace. Graphs. (H15, C, Cu, Fe)

23-H. Recent Soviet Research on the Effects of Additives in Alumina Sintering. W. G. Cass. *Ceramic Age,* v. 66, Dec. 1955, p. 16-18.

Liquid phase sintering, relation of melt to sintering, modes of production, precipitation of alumina. 12 ref. (H15, Al)

24-H. Effect of Irradiation on Hot-Pressed Boron Carbide. W. D. Valovage. *Knolls Atomic Power Laboratory (U. S. Atomic Energy Commission),* KAPL-1403, Nov. 1955, 45 p.

Specimens were irradiated in vacuo, in helium and in sodium to determine quantity of helium released and physical stability of the material after burnups as high as 36% of B-10 atoms. Micrographs, diagrams, tables, photographs. (H general)

25-H. Nickel Refining. Sidney Nashner. *Metal Industry,* v. 87, Dec. 23, 1955, p. 527-528.

Operation of major processes at a refinery for nickel powder production. Tables. (H10, C general, Ni)

26-H. Metal Sinterings. *Metal Industry,* v. 87, Dec. 23, 1955, p. 531-533.

Some applications of powder metal process to production of small parts for machinery. Photographs. (H general, T7)

27-H. (English.) **Magnetic Behavior of Fe-Ni Compacts Under Sintering Process.** Hiroshi Kojima. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 7, no. 3, June 1955, p. 321-328.

Density increase accompanying a rise in sintering temperature was independent of the alloy composition, but the magnetic saturation of higher nickel compact approached the solid alloy's value more rapidly than lower nickel specimens. Graphs. 12 ref. (H15, P16, Fe, Ni)

28-H. (Japanese.) **Powder Metallurgy of Iron and Steel—Review.** Haruo Kubota. *Iron & Steel Institute of Japan, Journal,* v. 41, no. 10, Oct. 1955, p. 1119-1130.

Includes photograph, tables, graphs. 18 ref. (H general, Fe, ST)

29-H. (Book.) **A Handbook of Hard Metals.** W. Hawihl. 162 p. 1955. Her Majesty's Stationery Office, York House, Kingsway, London, W.C. 2, England. $3.50.

Principles of the sintering technique, technical production, and principles for manufacturing hard metals into tools. (H general, T6)

30-H. (Czech.) **Improving the Quality of Sintered Carbides.** B. Cech. *Strojirnstvi,* v. 5, no. 11, Nov. 1955, p. 841-844.

Cutting tool strength and endurance and their effects on cutting operations. Effect of composition and manufacturing methods on quality. Graph, diagrams. 7 ref. (H general, G17, C-n)

31-H. (French.) **Possibility and Limits of Powder Metallurgy.** Michel Zeicher. *Revue universelle des mines,* v. 11, ser. 9, no. 11, Nov. 1955, p. 594-605.

Production methods and application of metals with high melting points; metal, metal-ceramic and porous compounds; semiconductors and pseudo-alloys of metals and metalloids. Future of powder metallurgy. Photographs, diagrams. 36 ref. (H general)

32-H. (Russian.) **Some Physico-Chemical Properties of Titanium Boride and Nitride Alloys.** G. V. Samsonov and E. V. Petrash. *Metallovedenie i obrabotka metallov,* no. 4, Oct., 1955, p. 19-24.

Compositions, melting temperatures, microhardness, thermal coefficient of linear expansion, lattice period, electrical resistance, microstructure, resistance to oxidation. Graphs, tables, diagram. 10 ref. (H general, P general, Ti, B)

33-H. Manufacture of Electric Contact Alloys and Sintered Iron Bearings. E. E. Rooste. *Australasian Engineer,* 1955, Nov., p. 53-55.

Manufacture of tungsten-copper and molybdenum-silver alloys as typical examples of the infiltration technique for the manufacture of contact alloys. Graphs, micrographs, photographs, table. (H16, SG-c, r, Fe)

34-H. Powder Metal Bushes. J. B. Mohler. *Metal Industry,* v. 88, Jan. 6, 1956, p. 3-6.

Use of powdered metal for bushings has proven very effective. Speed and load capacity are tested. Tables, photographs, graphs, diagram. (H general, T7, Fe, Cu)

35-H. Powder Metallurgy in Japan. Takashi Kimura and Henry H. Hausner. *Metal Progress,* v. 69, Jan. 1956, p. 61-64.

Review of two decades of work

with superior magnetic materials in Japanese industry. Carbide tools, porous bearings, electrical contacts are now produced in volume. Tables. (H general)

36-H. Preparation and Sintering of Molybdenum Silicide. W. Rutkowski. *Henry Brutcher Translation No.* 3593, 6 p. (Abridged from *Biuletyn informacyjny,* v. 6, no. 1, 1955, p. 1-3.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 125-H, 1955. (H15, Mo)

37-H. (German.) **Development and Position of Sintered Aluminum.** Alfred von Zeerleder. *Zeitschrift für Metallkunde,* v. 46, no. 11, Nov. 1955, p. 809-812.

Production methods, comparison with other metals, applications, physical properties. Tables, graphs, diagram, photograph, micrographs. (H general, Al)

38-H. (German.) **Behavior of Spheroidal Metal Powder During Pressing and Sintering.** Erich Pelzel. *Zeitschrift für Metallkunde,* v. 46, no. 11, Nov. 1955, p. 813-817.

Calculation of the contact surfaces under increasing compression of spheroidal-metal powder. Relation between porosity and the sum of contact surfaces. Micrograph, tables, graphs, diagrams. (H14, H15)

39-H. The Powder Metallurgy of Uranium. H. H. Hausner and J. L. Zambrow. *Sylvania Electric Products, Inc. (U. S. Atomic Energy Commission),* AECD-3665, May 1955, 18 p.

Characteristics of uranium hydride, factors controlling the rate of the hydride formation, sintering, pressing and re-pressing of uranium powder compacts. Graphs, micrographs, photograph. (H general, U)

40-H. Interaction Between Metals and Atmospheres During Sintering. John T. Norton. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Jan. 1956, p. 49-53.

Discusses adsorbed gases, evaporation of metals during sintering, reduction and carburization, surface tension and activated sintering. 11 ref. (H15)

41-H. Some Observations on Sintered Steel Powder Compacts. A. A. Krishnan and B. Halder. *Journal of Scientific & Industrial Research,* v. 14, sec. B, Dec. 1955, p. 643-651.

Investigation of sintering process with respect to volume, density, hardness, resistivity and size and shape of pores. A model demonstrating the interface energy theory of sintering is suggested. Diagrams, graphs, tables, micrographs. 13 ref. (H15, ST)

42-H. Can Powdered Metallurgy Save You Time and Money? Yes . . . Here's How! Samuel Bradbury, III, and George Karian. *Machine and Tool Blue Book,* v. 51, Feb. 1956, p. 105-111.

Among advantages are low tool cost, close tolerances, low production cost and high production rate, low material waste, and reduction of 10 to 50% in machining. Processes and equipment described. Photographs, diagram. (H general)

43-H. An Investigation of Boride Cermets. J. A. Stavrolakis, H. N. Barr and H. H. Rice. *American Ceramic Society Bulletin,* v. 35, Feb. 1956, p. 47-52.

Fabrication and properties of hot-pressed bodies composed of manganese, boron and silicon metal and manganese, calcium and silicon borides. Tables, micrographs. 3 ref. (H general, Mn, Si, B, Ca)

44-H. Cermets: I. Fundamental Concepts Related to Microstructure and Physical Properties of Cermet Systems. Michael Humenik, Jr., and Niranjan M. Parikh. *American Ceramic Society, Journal,* v. 39, Feb. 1956, p. 60-63.

Evaluation of the microstructure of tungsten carbide and titanium carbide base cermets on the basis of wettability of the carbide phase. Diagrams, graphs, micrographs, tables. 6 ref. (H general, M27, Ti, W)

45-H. An Oxidation Study of Cobalt-Alumina Mixtures. W. B. Crandall and R. R. West. *American Ceramic Society Bulletin,* v. 35, Feb. 1956, p. 66-70.

Weight change, differential thermal and X-ray diffraction analysis data used to propose a mechanism by which oxidation proceeds in porous compacts. Diagram, tables, graphs. 15 ref. (H general, R2, Co)

46-H. Pressing and Sintering Metal Powders. G. R. Bell. *Chemical Metallurgical & Mining Society of South Africa, Journal,* v. 56, Jan. 1956, p. 259-276.

Principles by which powders can be pressed into strong compacts and sintered to develop high mechanical strength. Tables, diagrams, graphs, micrographs. (H14, H15)

47-H. At 1600° F+ Try Molybdenum Disilicide for Strength, Oxidation Resistance, Corrosion Resistance. *Materials & Methods,* v. 43, Jan. 1956, p. 131, 133.

Molybdenum disilicide will find

many elevated temperature applications where only moderate resistance to thermal shock is required. Fabrication and properties discussed. Photographs, table. (H general, Mo)

48-H. Get Those Sharp Corners Without Machining. *Precision Metal Molding,* v. 14, Feb. 1956, p. 53, 64.

An example of the use of powder metallurgy in producing angles without appreciable radius. Photograph, diagram. (H general)

49-H. Powder Metallurgy for Research Into Ferromagnetic Materials. C. E. Richards, E. V. Walker and A. C. Lynch. Paper from "Conference on Magnetism and Magnetic Materials". American Institute of Electrical Engineers, p. 131-133.

Effect of processing variables on purity and magnetic properties of products. Graphs. 7 ref. (H general, P16)

50-H. The Use of Powder Metallurgy in the Production of Soft Magnetic Materials. H. Evans, C. Gordon Smith and D. K. Worn. Paper from "Conference on Magnetism and Magnetic Materials". American Institute of Electrical Engineers, p. 134-141.

Review of powder metallurgy techniques and applications. Effects of fabrication procedures on properties. Tables, micrographs, photograph, diagrams, graphs. 14 ref. (H general, SG-p)

51-H. (German.) **Dilation and Contraction of Polycrystalline Pressed Articles Under the Influence of Heat.** K. Kohler. *Metall,* v. 10, nos. 1-2, Jan. 1956, p. 21-29.

Factors influencing dimensional changes under application of heat include size and structure of grains, inner surfaces, absorbed gas volume, pressure and pressure direction applied to the item and temperature. Tables, graphs, diagram. 31 ref. (H11, EG-a, Fe)

52-H. (Russian.) **Strength of Sintered-Carbide Disks as Affected by the Quantity of Fine Tungsten Carbide Grains.** *Metallovedenie i obrabotka metallov,* supplement to no. 6, Dec. 1955, p. 61-63.

Microstructural variations. Yield strength in bending for various percentages of finer grains. Micrographs, table, graph. (H general, Q23, C-n)

53-H. Density Distribution in Metal Powder Compacts. G. C. Kuczynski and I. Zaplatynskyj. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Feb. 1956, p. 215.

Density distribution is obtained from relationship between hardness and density, found by measuring hardness and densities of thin compacts. Graphs, 2 ref. (H11)

54-H. (German.) **Investigation of the Sintering Process of Copper-Nickel by Magnetic Analysis, With Special Consideration to Short Sintering Time.** K. Torkar and H. Mariacher. *Planseeberichte für Pulvermetallurgie,* v. 3, no. 3, Dec. 1955, p. 78-86.

Preparation of samples, determination of activating energy, possibilities of superstructure formations. Graphs, micrographs. 10 ref. (H15, P16, Cu, Ni)

55-H. (Book.) **Powder Metallurgy.** Technical Assistance Mission No. 141. 309 p. 1955. Organisation for European Economic Co-operation, 2, rue Andre-Pascal, Paris, France.

Subject is organized into the following four groups: electrical and magnetic materials; hard metals; refractory materials; engineering powders and structural parts. (H general)

56-H. The Powder Metallurgy of Titanium. D. A. Robins. *Light Metals,* v. 19 Feb. 1956, p. 60-63.

Types of powder; pressing and sintering; properties and applications. Diagram, tables, photographs. 10 ref. (H general, Ti)

57-H. Here's How Powdered Metallurgy Can Save You Money. II. The Application, Advantages and Limitations of Powdered Metallurgy. Samuel Bradburg, III, and George Karian. *Machine and Tool Blue Book,* v. 51, Mar. 1956, p. 121-130.

Advantages are low material waste, low tooling and production costs, high production rates, wide range of physical properties, production of parts not possible by other methods. Includes limitations to design and size of parts and a chart of compositions, their properties and uses. Tables, diagrams, graphs. (H general)

58-H. Powder Metallurgy Permits Air Cooling of Turbine Blades. R. W. A. Buswell, I. Jenkins and E. R. Perry. *Metal Progress,* v. 69, Mar. 1956, p. 52-56.

Practical solution to operating engines with gas at over 2000° F. was developed in England. Matrices of many tiny cooling passages are formed in metallic blades and vanes by volatile cores properly placed in powder metal pressings. Photographs, graphs, micrographs, tables. (H general T25 SG-h, Co)

59-H. The Powder Metallurgy of Zirconium-Tin Alloys. I. Henry H. Hausner and Richard M. Treco. *Sylvania Electric Products, Inc. (U. S. Atomic Energy Commission),* SEP-85, Feb. 1952, 21 p.

Feasibility of manufacturing zirconium-tin alloys by powder metallurgical methods. Corrosion rates and other physical properties of various alloys. Results from crystal bar zirconium compared with those from zirconium sponge. Graphs, micrographs, tables. (H general, R general, EG-d)

60-H. (Italian.) **Copper-Beryllium Sintering.** G. Venturello and L. Donadio. *Metallurgia Italiana,* v. 47, Special Supplement to No. 12, Dec. 1955, p. 3-10; disc. p. 10.

Preparation of 2% beryllium alloy by sintering. Best results achieved at pressure of 10 tons per sq.cm. and sintering at 840° C. for 8 hr. Graphs, micrographs, tables. 10 ref. (H15, Be, Cu)

61-H. (Italian.) **Contribution to Copper Sintering.** A. Bia. *Metallurgia Italiana,* v. 47, Special Supplement to No. 12, Dec. 1955, p. 13-14; disc., p. 14.

Investigation of sintering between 0.5 and 1.5 hr. at temperatures from 850 to 1050° C. Graphs. (H15, Cu)

62-H. (Italian.) **Sintered Metal Parts as Babbitts.** P. Pensa. *Metallurgia Italiana,* v. 47, Special Supplement to No. 12, Dec. 1955, p. 17-21; disc., p. 21.

Compositions, industrial processing, applications, market conditions. Diagrams, micrographs, photograph, graphs. 8 ref. (H general, SG-c)

63-H. (Italian.) **On Some Electric Sintering Furnaces.** O. Dorigo. *Metallurgia Italiana,* v. 47, Special Supplement to No. 12, Dec. 1955, p. 23-25; disc., p. 25.

Brief report on 11 European companies; various types of furnaces for refractory materials, hard alloys, iron sintering and bronze sintering. Diagrams. (H15, W, Mo, Fe, Cu)

64-H. (Russian.) **Effect of Impregnation on the Compressive Strength of Porous Iron.** V. G. Filimonov. *Vestnik mashinostroeniia,* v. 36, no. 1, Jan. 1956, p. 57-58.

Relation between strength of powder metal part during machining and the consistency and viscosity of the oils, or other lubricants, in the pores. Impregnation affects tensile strength only slightly. Tables, graph. (H16, Q28, Fe)

65-H. Production of Borides of High-Melting Metals at Elevated Temperature in Vacuum. G. A. Meerson and G. V. Samsonov. *Henry Brutcher Translation No.* 3658, 9 p. (Abridged from *Zhurnal Prikladnoi Khimii SSSR,* v. 27, no. 10, 1954, p. 1115-1120.) Henry Brutcher, Altadena, Calif.

Procedure for preparing borides of titanium, vanadium, columbium, zirconium, tantalum and tungsten by reaction of the metal oxides with boron carbide and carbon black. Tables, graph, diagrams. 4 ref. (H10, Ti, V, Cb, Zr, Ta, W)

66-H. Compressibility of Powders of Borides, Carbides, and Nitrides of High-Melting Metals. G. V. Samsonov and V. S. Neshpor. *Henry Brutcher Translation No.* 3661, 7 p. (From *Doklady Akademii Nauk SSSR,* v. 104, no. 3, 1955, p. 405-408.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 9-H, 1956. (H11, Ti, Zr, W)

67-H. (Dutch.) **Copper and Copper Alloys. XV. Powder Metallurgy in Its Special Application to Copper and Copper Alloys.** W. R. G. de Jager. *Metalen,* v. 11, no. 3, Feb. 15, 1956, p. 62-64.

Production of powders. (To be continued.) Micrographs. 3 ref. (H10, Cu)

68-H. (German.) **Powdered Materials Prepared From Aluminum.** Günter Wassermann and Richard Weber. *Zeitschrift für Metallkunde,* v. 47, no. 2, Feb. 1956, p. 74-78.

Appropriate processing methods of impact extruding, drop forging, rolling and die-pressing. Tables, photographs, micrograph. 11 ref. (H14, Al)

69-H. (Pamphlet.) **Powder Metallurgy —Now (New Techniques, Improved Properties, Wider Use).** F. V. Lenel. Fifty-Eighth Annual Meeting, American Society For Testing Materials, H. W. Gillett Memorial Lecture. 34 p. 1955.

Mechanical properties of structural parts, some recently developed techniques for making semifabricated products from powder, role of powder metallurgy in development of high-temperature materials. Graphs, photographs, tables, diagram. 32 ref. (H general)

70-H. Fabrication of Thorium Powders. W. W. Beaver, K. G. Wikle and J. G. Klein. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Apr. 1956, p. 445-454.

Consolidation of hydride process, electrolytic, calcium reduced and comminuted thorium powder, as well as saw chips and lathe turnings, by vacuum hot pressing and by cold pressing-vacuum sintering. Mechanical properties of the consolidated material in the extruded form compared with those of wrought castings. Diagram, graphs, micrographs, photographs, tables. 26 ref. (H14, Q general, Th)

71-H. Selecting Cermets for High-Temperature Applications. J. T. Norton. *Machine Design,* v. 28, Apr. 19, 1956, p. 143-146, 148.

Fabrication of carbide parts, properties of carbide, boride and oxide-base cermets, intermetallics. Graphs. (H general, Ti, C-n)

72-H. Aluminum Powder Metallurgy Products. John P. Lyle, Jr. *Materials & Methods,* v. 43, Apr. 1956, p. 106-111.

Compacts of fine aluminum powder containing aluminum oxide have outstanding strengths above 600° F. Two APM alloys raise the useful range of aluminum alloys by about 300° F. Tables, graphs, photograph. 5 ref.
(H12, Q general, T general, Al)

73-H. Cermets for High Temperature Service. J. T. Norton. *Mechanical Engineering,* v. 78, Apr. 1956, p. 319-322.

Ceramics combine with metals to meet the critical demands of modern technology. Graphs, micrographs. (H general)

74-H. High-Temperature Parts Based on Titanium Carbide. Walther L. Havekotte. *Metal Progress,* v. 69, Apr. 1956, p. 56-61.

Properties vary with composition of metallic binder, carbon content and porosity. Manufacturing methods are stabilized for products of light weight and high rupture strength, all are quite brittle at room temperature. Graphs, micrographs, photographs, tables.
(H general, Ti, C-n)

75-H. (Dutch.) **Copper and Copper Alloys. XV. Powder Metallurgy, Its Special Application to Copper and Copper Alloys.** W. G. R. de Jager. *Metalen,* v. 11, no. 5, Mar. 15, 1956, p. 109-113.

Physical properties of metal powders. Particle size, shape and arrangement. Tables, graph. 2 ref. (To be continued.) (H11, Cu)

76-H. (French.) **Preparation and Utilization of Metal Powders.** M. Van Den Bosch. *Métaux, Corrosion-Industries,* v. 31, no. 366, Feb. 1956, p. 53-69.

Sintering, mechanical, chemical, pulverization and electrolytic methods of preparation, properties and uses. Diagrams, tables, photographs, micrographs. (H general)

77-H. (French.) **Production and Use of Metallic Carbides and Heavy Alloys.** Robert Girschig. *Métaux, Corrosion-Industries,* v. 31, no. 366, Feb. 1956, p. 80-93.

Production and sintering of tungsten carbide, uses of tungsten-base and other heavy alloys. Photographs, graph, micrographs.
(H general, T6, EG-h, W)

78-H. (German.) **The Sintering Reaction.** E. Meyer-Hartwig. *Berichte der Deutschen Keramischen Gesellschaft,* v. 33, no. 3, Mar. 1956, p. 85-91.

Classification and significance of semimetallic material. Physics of sintering and sintering mechanism of metals and metal compounds. The sintering reaction and its evaluation. Process, application and materials used. Thermal data and graphs of reactions. Tables, diagrams, photographs. (H15)

79-H. (Swedish.) **Reduction Structures of Iron Powder.** John Olof Edström. *Jernkontorets Annaler,* v. 140, no. 2, 1956, p. 116-129.

By selecting a suitable degree of oxidation, reduction temperature and gas composition, it is possible to control amount and appearance of pores in iron powder directly reduced by gas from concentrate. Micrographs, graphs, tables. 3 ref.
(H10, H11, Fe)

80-H. Fabrication of Beryllium and Zirconium Shapes by Power Metallurgy. A. J. Stonehouse and W. W. Beaver. *Brush Beryllium Company, (U. S. Atomic Energy Commission),* BBC-51, May, 1950, 51 p.

A means of rolling nickel-jacketed sheets of beryllium and zirconium, extrusion of various shapes of their sinters. Tables, diagram, photographs. (H general, F23, F24, Be, Zr)

81-H. Nickel-Cadmium Batteries. I. Sintered Plates From a New Canadian Nickel Powder. E. J. Casey, P. L. Bourgault and Phyllis E. Lake. *Canadian Journal of Technology,* v. 34, May, 1956, p. 95-103.

Sintered plates of high porosity and good mechanical strength were made from a new domestic nickel powder. New plates had 15 to 30% less capacity loss than commercial plates at high discharge rates. Tables, micrographs. 8 ref.
(H general, T1, P15, Ni, Cd)

82-H. Titanium-Carbide-Base Cermets for High-Temperature Service.

K. Pfaffinger, H. Blumenthal and F. W. Glaser. Paper from "Symposium on Metallic Materials for Service Temperatures Above 1600° F". American Society for Testing Materials, p. 90-99; disc., p. 99-102.

Development of cermets containing 25 to 65% of nickel-chromium or nickel-cobalt-chromium binder. Physical properties, production procedures, applications. Diagram, micrographs, photographs, graphs, tables. 7 ref.
(H general, Q general, C-n)

83-H. Titanium-Carbide Products Produced by the Infiltration Technique. Leonard P. Skolnick and Claus G. Goetzel. Paper from "Symposium on Metallic Materials for Service at Temperatures Above 1600° F". American Society for Testing Materials, p. 103-109; disc., p. 110.

Impact strength is superior to that of the conventional cemented materials. Technique permits the use of low pressures for compacting the powders, making possible direct pressing of complex shapes. Photograph, graphs, table, micrographs. 5 ref. (H16, Ti)

84-H. Cermets. John W. Graham and John C. Redmond. Paper from "High-Temperature Technology". John Wiley & Sons. p. 208-232.

Fundamental characteristics; composition and properties; oxide-interstitial compounds-metal cermets; carbide-type cermets; stress-rupture strength. Applications of cermets. Graphs, photograph, tables. 29 ref. (H general)

85-H. Sintering of Metallic and Nonmetallic Refractory Materials. D. R. Wilder. Paper from "High-Temperature Technology". John Wiley & Sons. p. 235-250.

Deals primarily with pure ceramic and hard-metal refractory sintering mechanisms with occasional references to the low-melting metals and pure refractory metals for illustrative purposes. 117 ref. (H15)

86-H. Metal Powder Slip Castings. Henry H. Hausner and Donald P. Ferriss. *Materials & Methods,* v. 43, May 1956, p. 132-134.

Slip casting extends the scope of parts which can be fabricated by powder metallurgy, looks promising for parts having undercuts, reverse curvatures and lateral projections. Photographs. 4 ref.
(H14, SS, W, Mo)

87-H. Preparation and Evaluation of Cr-Ti-O Compositions. William Arbiter. *Powder Metallurgy Bulletin,* v. 7, Apr. 1956, p. 65-68.

High-temperature properties investigated. Poor impact resistance discourages their use for jet engine applications. Tables. 1 ref.
(H general, Q6, Cr, Ti)

88-H. Recent Developments in the Application of Transition Metal Borides. Arnold Blum and William Ivanick. *Powder Metallurgy Bulletin,* v. 7, Apr. 1956, p. 75-78.

Presentation of transition metal borides which, originally developed for aircraft power plant applications, are now being used widely for their outstanding liquid metal corrosion resistance, high-temperature stability in vacuum, superior oxidation resistance and strength at high temperatures. Tables, photograph.
(H general, Q general, T24)

89-H. Production of Transition Metal Diborides and Their Solid Solutions From Metal Oxides and Boron Oxide. Herman Blumenthal. *Powder Metallurgy Bulletin,* v. 7, Apr. 1956, p. 79-81.

Simple and inexpensive production process could be developed into a continuous process, if the necessity for the manufacture of these products on a large scale should arise in the future. Tables. 3 ref.
(H general)

90-H. Cermets and the Problem of Impact Strength. Frank W. Glaser and N. Grossman. *Powder Metallurgy Bulletin,* v. 7, Apr. 1956, p. 90-93.

A systematic testing program was carried out using a series of titanium-carbide base cermet materials containing a nickel-cobalt-chromium alloy as binder in the proportion of 60-20-60. 5 ref. (H general, Q6, Ti)

91-H. On Vacuum Furnaces With Induction Heating and With Molybdenum Resistor Heating. W. Hennig and O. Winkler. *Powder Metallurgy Bulletin,* v. 7, Apr. 1956, p. 102-107

Construction of sintering furnaces, resistance furnaces with molybdenum heating elements, comparison of power consumption in the two furnace types. Diagrams, graphs, photographs. (H15)

92-H. The Present Status of Molybdenum Production. R. Kieffer and F. Benesovsky. *Powder Metallurgy Bulletin,* v. 7, Apr. 1956, p. 113-121.

Essential features of three processes by which ingots for the manufacture of semifinished molybdenum parts are obtained: direct sintering, indirect sintering, and high vacuum arc casting. Diagrams, photographs, table. 13 ref. (H15, C5, Mo)

93-H. Powder Metallurgy and the Fight Against Corrosion. R. L. Meyer. *Powder Metallurgy Bulletin,* v. 7, Apr. 1956, p. 124-129.

Protection of the materials and products of powder metallurgy against corrosion, sintered metallic materials resistant to corrosion and to oxidation at high temperature, use of metal powders in protective coatings. 1 ref.
(H general, R general)

94-H. Powder Metallurgy of Thorium Hydrides. Samuel Storchheim. *Powder Metallurgy Bulletin,* v. 7, Apr. 1956, p. 158-162.

Powder metallurgy of two hydrides, ThH_3 and ThH_x, where x approaches the value of 4. Graphs, table. 5 ref. (H general, Th)

95-H. Quality Control of Cemented Carbides. W. C. Seitz and J. H. Powers. *Tooling and Production,* v. 22, May 1956, p. 93-94, 104.

Primary steps in the manufacture of cemented tungsten carbide outlined and discussed. Diagram, photographs. (H general, W)

96-H. Powder Metallurgy of Thorium. G. A. Meyerson. Paper from "Proceedings of the International Conference on the Peaceful Uses of Atomic Energy. v. VIII. Production Technology of the Materials Used for Nuclear Energy". United Nations. p. 188-192.

Calcium reduction of thoria and the subsequent pressing and sintering of thorium powders produced by both calcium reduction and electrolysis. Tables, graphs.
(H general, Th)

97-H. Preparation, Identification and Chemical Properties of the Niobium Germanides. John H. Carpenter and Alan W. Searcy. *American Chemical Society, Journal,* v. 78, May 20, 1956, p. 2079-2081.

An X-ray diffraction investigation establishes the existence of compounds of compositions $NbGe_{0.67\pm0.05}$, NbGe $_{0.54\pm0.06}$ and Nb_3Ge in addition to $NbGe_2$, which had previously been reported. The compounds were formed by powder metallurgical techniques. Tables. 9 ref. (H general, Cb, Ge)

98-H. Titanium Powder Metallurgy. I. Present Status of Titanium Powder. R. F. Bunshah, H. Margolin and I. B. Cadoff. *Precision Metal Molding,* v. 14, May 1956, p. 38-40, 67.

Present status of development. Photographs, tables. (To be continued.) (H general, Ti)

99-H. (German.) Calculation of Pressure Conditions in Powder Metallurgy. Karl Torkar. *Archiv für das Eisenhüttenwesen,* v. 27, no. 4, Apr. 1956, p. 285-288.

Derivation of an equation expressing pressure conditions in compressing powder to cylindrical compacts. Tables, graphs, diagram. 8 ref. (H14)

100-H. Investigation of the Powder Metallurgy of Thorium. I. W. G. Lidman and T. Weissmann. *U. S. Atomic Energy Commission, SEP-138,* 1955, 25 p.

Effect of compacting pressure, sintering time, temperature and atmosphere on the density, hardness, and microstructures of thorium prepared by powder metallurgy. Tables, graphs, micrographs. 2 ref.
(H general, Th)

101-H. (Polish.) Sintering of Boron Carbide Under Pressure. Edmund Bryjak, Witold Missol and Zbigniew Bojarski. *Hutnik,* v. 23, no. 3, Mar. 1956, p. 117-125.

Sintering process of B_4C, B_4C-Fe, B_4C-Si and B_4C-FeSi under pressure. Optimal temperature and density. Tables, graphs, diagram, micrographs, diffractograms. 8 ref.
(H15, B, C-n)

102-H. (Russian.) Cermet Hard Alloys With Unequal Distribution of the Carbide Component, for the Machining of Abrasive Materials. G. A. Meerson and G. V. Samsonov. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* no. 4, Apr. 1956, p. 121-125.

Relation between wear resistance, brittleness, amount of cementing metal (cobalt), and cermet alloy proportions. Diagram, micrographs, graph, table. 4 ref.
(H general, G17, Q9, C-n, W)

103-H. Basic Research on Sintered Titanium Powder Analogous to "SAP" for High Temperature Strength. *Brush Laboratories Company, Bi-Monthly Reports, U. S. Navy Bureau of Aeronautics, Contract No.* NOas-55-505-C, Feb. 1955-Sept. 1955. 13, 13, 12, and 14 p.

Siliconizing of titanium hydride. Compaction, sintering, extrusion and evaluation of titanium compacts. Tables, graphs, diagrams.
(H general, Ti)

104-H. The Porosity and Permeability of Hot-Compacted Copper Powder. G. Arthur. *Institute of Metals, Journal,* v. 84, May 1956, p. 327-332.

Effect of compacting pressure and temperature on permeability and porosity and on stability of the specimens on subsequent sintering. Diagram, graphs, tables. 16 ref.
(H11, H14, Cu)

105-H. On the Rate of Sintering. Gerhard Bockstiegel. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, May. 1956, p. 580-585.

Kuczynski's formula was derived for the case of nonspherical particles. Two similar formulae were derived, one describing the increase in tensile strength, the other describing the progress of shrinkage of a powder compact. Diagrams, graphs. 8 ref. (H15)

106-H. On the Use of Lineal Analysis for Obtaining Particle Size Distribution Functions in Opaque Samples. J. W. Cahn and R. L. Fullman. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, May 1956, p. 610-612.

A method for obtaining the distribution of sphere diameters and plate thicknesses (or pearlite spacings) from size distribution functions obtained along randomly oriented lines. 6 ref. (H11)

107-H. Boride Parts Resist Molten Zinc. R. M. Evans. *Materials & Methods,* v. 43, June 1956, p. 132-133.

Compacts composed of a boron compound plus a metal are heat and corrosion resistant and compare favorably in strength with graphite and gray iron. Graph, table, photographs. (H general, R6, B)

108-H. Titanium Powder Metallurgy. II. R. F. Bunshah, H. Margolin and I. B. Cadoff. *Precision Metal Molding,* v. 14, June 1956, p. 42-43, 137-138.

Fabrication techniques. Diagram. (H general, Ti)

109-H. Titanium Powder Metallurgy. III. R. F. Bunshah, H. Margolin and I. B. Cadoff. *Precision Metal Molding,* v. 14, July 1956, p. 41-42, 44, 73.

Design factors and some properties that can be obtained. (H general, Ti)

110-H. True Stresses in Compression Testing of Metal-Powder Compacts. V. G. Filimonov. *Henry Brutcher Translation No.* 3721, 4 p. (From *Zavodskaya Laboratoriya,* v. 21, no. 1, 1955, p. 82-84.) Henry Brutcher, Altadena, Calif.

A method of calculating and plotting true stress-strain curves. True and apparent stress-strain curves for specimens having pore volumes of 20 to 30%. (H11, Q25)

111-H. Titanium Parts Made by Powder Metallurgy Methods. George J. Wile. *Materials & Methods,* v. 44, July 1956, p. 95-97.

By using press forming and hot pressing techniques to replace forgings in the manufacture of jet engine bearing housings, waste is reduced and production costs lowered by as much as 25%. (H14, Ti)

112-H. (Czech.) **Technology and Properties of Materials Manufactured by Powder Metallurgy.** M. Petrdlik. *Strojirenska vyroba,* v. 4, no. 3, Mar. 1956, p. 101-105.

Manufacture of metal powders, including processing, mixing, pressing and compacting. Sintering furnaces and other equipment. Strength and wear properties of bearings made of sintered metals. Other products. Large-scale production problems and economics.
(H general, Ay, Fe, Cu, Q23, Q9)

113-H. (Dutch.) **Copper and Copper Alloys. XVII. Powder Metallurgy Data as It Applies to Copper and Copper Alloys.** W. G. R. de Jager. *Metalen,* v. 11, no. 9, May 15, 1956, p. 203-207.

Chemical properties of metal powders, gaseous impurities, commercially available copper powders, powders produced electrolytically by copper oxide reduction and by atomization. (H10, H11, Cu)

114-H. (Dutch.) **Copper and Copper Alloys.** W. G. R. de Jager. *Metalen,* v. 11, no. 11, June 15, 1956, p. 246-247.

Estimation of the quality of metal powders. Packaging, mixing of metal powders with nonmetallic substances. (H11, H12, Cu)

115-H. (French.) **New Developments of Powder Metallurgy in the Field of High-Temperature Materials.** R. Meyer. *Métaux, Corrosion-Industries,* v. 31, no. 369, May 1956, p. 219-232.

Study of titanium carbide, chromium boride and zirconium boride cermets, molybdenum silicide and nickel aluminide. (H general, SG-h)

116-H. (German.) **Silver-Cadmium-Base Materials for Electrical Contacts and Their Heat Treatment.** H. Spengler. *Metall,* v. 10, no. 13-14, July 1956, p. 628-632.

Compares manufacture of silver-cadmium oxide electric contact materials, by powder metallurgy and by internal oxidation, giving preference to the latter method. Discusses, on the basis of experimental data, the mechanism of internal oxidation of silver-cadmium alloys, its influence on the properties and the structure of the alloys, and the relationship between the hardness and the grain size of cadmium oxide crystals.
(H general, J2, SG-r, Ag, Cd)

117-H. Sintered Components. *Automobile Engineer,* v. 46, July 1956, p. 268-275.

Rapid and economical production of intricate structural or working parts by powder metallurgy techniques. (H general)

118-H. Sintered Friction Materials. W. Cegielski. *Henry Brutcher, Translation No.* 3711, 9 p. (Abridged from *Prace Imh,* v. 7, no. 7, 1955, p. 17-23.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 115-H, 1955. (H general)

119-H. Aluminum-Base Materials Produced by Powder Metallurgy. G. Wassermann and R. Weber. *Henry Brutcher, Translation No.* 3741, 10 p. (Abridged from *Zeitschrift Metallkunde,* v. 47, no. 2, 1956, p. 74-78.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 68-H, 1956. (H14, Al)

120-H. Infiltration of TiC Skeletons. Herman Blumenthal and Ronald Silverman. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, sec. 2, Aug. 1956, p. 977-981.

Infiltrability of a porous TiC compact, produced by powder metallurgy technique, depends on the capillarity of the compact and the surface condition and nature of the individual particles. (H16, Ti)

121-H. (Czech.) **Producing Protective Atmospheres by Partial Burning of Coke Gas for Hot Working Metals.** J. Belak. *Hutnik,* v. 6, no. 6, June 1956, p. 178-180.

Experiments in the use of partially burned coke gas for producing a protective atmosphere in powdered iron technology. Proportions of elements to be used. (H15, J2, Fe)

122-H. (Czech.) **On the Processes of Sintering Carbides by Liquid Phase.** Bohuslav Cech. *Hutnické Listy,* v. 11, no. 7, July 1956, p. 419-424.

Demonstrates that crystallites grow, having size of the order of 1 mm. Explains relation between structure and important properties of sintered carbides. (H15, N3, Cr, Co, W)

123-H. (Dutch.) **Copper and Copper Alloys.** W. G. R. de Jager. *Metalen,* v. 11, no. 13, July 16, 1956, p. 290-292.

Data on powder metallurgy, applications, pressing and sintering. (To be continued.) (H14, H15, Cu)

124-H. (German.) **Production, Properties, and Field of Application of Aluminium Powder.** Carl Schlenk. *Aluminium,* v. 32, no. 8, Aug. 1956, p. 486-490.

Powder production methods. Applications in the paint and plastics industries, and the production of foamed concrete. Sintered aluminum powder metallurgy. (H10, H11, T29, Al)

125-H. Powder Metallurgy. I. J. F. C. Morden. *Metal Industry,* v. 89, Aug. 17, 1956, p. 123-126.

Powder characteristics, particle size distribution, sedimentation methods. (To be continued.) (H11)

126-H. (Dutch.) **Copper and Copper Alloys.** W. G. R. deJager. *Metalen,* v. 11, no. 15, Aug. 15, 1956, p. 329-334.

Manufacture of articles from copper plus tin, nickel or other metal powders, molding and sintering processes, shrinkage, various qualities obtained. (H10, H14, H15, Cu)

127-H. A Laboratory Study of the Sintering Process. E. W. Voice and R. Wild. *Iron and Steel Institute, Journal,* v. 183, Aug. 1956, p. 404-410.

Bed temperature and pressure distribution, flame front travel and air and heat requirements can all be studied effectively on laboratory scale. (H15)

128-H. Powder Metallurgy. II. J. F. C. Morden. *Metal Industry,* v. 89, Aug. 24, 1956, p. 146-147.

Microstructure and surface conditions of various types of particles. (H11, M27)

129-H. Metal Powder Rolling—A New Fabrication Technique. Samuel Storchheim. *Metal Progress,* v. 70, Sept. 1956, p. 120-126.

German wartime work has been extended to 18-8 stainless steel and other powder metal combinations for manufacturing fuel elements for atomic power reactors. (H14, Fe, SS, Al)

130-H. Slip Casting of Stainless Steel Powder. II. W. G. Lidman and R. V. Rubino. *Precision Metal Molding,* v. 14, Sept. 1956, p. 64-66, 98.

Composition and properties of a casting slip, sintering, comparison of properties of slip-cast samples. (H14, H15, SS)

131-H. (English.) **Amalgam-Metallurgic Preparation of Iron, Cobalt, and Nickel Powders.** Rolf Brännland, Jan-Anders Leffler and Inge Fäldt. *Svensk Kemisk Tidskrift,* v. 68, no. 6-7, June-July 1956, p. 380-386.

By partial oxidation, the primary grains of the suspension obtained by electrolysis are preserved and separated from the mercury phase. (H10, Fe, Co, Ni)

132-H. (Russian.) **Studying the Sintering of Metallic Powder Mixtures.**

The Copper-Nickel System, Isometric Powders. Ia. E. Geguzin. *Fizika Metallov i Metallovedenie,* v. 2, no. 3, 1956, p. 406-417.

A study of the interconnection between diffusion and self-diffusion in the process of sintering of porous bodies obtained by pressing mixtures of different powder metals. (H15, N1, Cu, Ni)

133-H. Metal Powders Provide Unmatched Diversity in Fabrication. J. H. Legg. *Canadian Metals,* v. 19, Sept. 1956, p. 34, 36, 38.

Present-day developments, principal uses, powder production methods, future applications. (H general)

134-H. (Russian.) **Effect of Anions on Hydrate Formation, pH Value, and the Electro-Precipitation of Powdered Metal From Ferrous Sulfate Solution.** A. I. Levin and S. A. Pushkarevo. *Zhurnal Prikladnoi Khimii,* v. 29, no. 8, Aug. 1956, p. 1223-1229.

Effect of valence, concentration of iron salt, presence of organic compounds. Experimental data. (H10, Fe)

135-H. Powder Metallurgy Reviewed. L. D. Brownlee. *Engineering,* v. 182, Sept. 14, 1956, p. 331-332.

Basic techniques, molybdenum, hard metals, sintered iron, new developments. (H general, Fe, Ti, W, Mo, Co)

136-H. Apparatus for Preparing Metal Powders Under Protective Atmospheres. H. L. Nurnberg, R. F. Domagala and D. W. Levinson. *Review of Scientific Instruments,* v. 27, Sept. 1956, p. 728-729.

Consists of a hermetically sealed chamber provided with a drive mechanism at the top, specimen and sight ports at the sides and a funnel at the bottom. Drive mechanism is used to rapidly rotate a rotary cutter. (H10)

137-H. Further Investigation of the Feasibility of the Freeze-Casting Method for Forming Full-Size Infiltrated Titanium Carbide Turbine Blades. E. M. Grala. *U. S. National Advisory Committee for Aeronautics, Technical Note* 3769, Oct. 1956, 19 p.

A thick slip of titanium carbide was prepared with a small amount of binder, cast into a mold by vibration, centrifuged, frozen to retain the shape of the mold, dried in an absorbent sand and sintered. The porous casting could then be infiltrated with a nickel or cobalt-base alloy. (H14, H16, Ti)

138-H. (Dutch.) **Copper and Copper Alloys.** W. G. R. de Jager. *Metalen,* v. 11, no. 17, Sept. 15, 1956, p. 386-390.

A study of powder metallurgy applied to copper and various alloys, its application to the manufacture of small delicate machine parts, tools and instruments of high precision. (H general, T7, Cu)

139-H. Which Metal Powder Part? Robert Talmage, William J. Doelker and Carl G. Johnson. *Materials & Methods,* v. 44, Oct. 1956, p. 116-117.

Discusses intermediate density, high density and infiltrated iron powder parts. Presentation affords a direct comparison of the materials for a given application. (H general, Fe)

140-H. The Fundamental Properties of Metals and Powder Metallurgy. H. W. Greenwood. *Metallurgia,* v. 54, no. 324, Oct. 1956, p. 187-188.

Improvement in the properties, particularly ductility, of certain metals as small amounts of impurities are removed. Beneficial effects of grain coatings; production of alloys in powder form. (H general, Al, Mg, Zr, Ti, Fe)

141-H. Particle Size Determination in Powder Metallurgy. A General Review of Available Methods. L. A. Phelps. *Metallurgia,* v. 54, no. 324, Oct. 1956, p. 197-200.

Basic principles underlying the methods for obtaining size range of raw materials and its distribution within that range. (H11)

142-H. Sintering Furnace Maintenance. (Digest of "Some Aspects of Sintering Furnace Maintenance", by George Otto, presented at the annual meeting of the Metal Powder Assoc., April, 1956). *Metal Progress,* v. 70, Oct. 1956, p. 194.

Burn-off twice weekly, slightly lowered voltage and other changes were made to improve element life in a furnace used to sinter bronze bearings. (H15, Cu)

143-H. (Dutch.) **Powder Metallurgy of Nonferrous Metals, Especially of Copper and Copper Alloys.** W. G. R. de Jager. *Metaalinstituut T. N. O.,* no. 44, Sept. 1956, 36 p.

Powder production and properties, mixing, forming and sintering procedures. (H general, EG-a, Cu)

144-H. (German.) **Investigation of "Nowotny" Phases.** R. Kieffer, F. Benesovsky and B. Lux. *Planseeberichte für Pulvermetallurgie,* v. 4, no. 2, Aug. 1956, p. 30-36.

Preparation of metal silicides, effects of additions of boron, nitrogen, carbon and oxides on various metal-silicon systems. (H general, Si)

145-H. Titanium Nitride: Its Preparation and "Hard-Metal" Properties. I. C. Kraitzer and I. E. Newnham. *Australian Journal of Applied Science,* v. 7, Sept. 1956, p. 215-223 + 1 plate.

Compound is produced from titanium tetrachloride and ammonia by a simple low-cost process. When mixed with suitable alloying elements the powder can be compacted and sintered to give products with typical "hard-metal" properties.
(H general, Ti)

146-H. (Czech.) **Sintering of Tantalum.** Jiri Vacek. *Hutnické Listy,* v. 11, no. 9, Sept. 1956, p. 522-529.

Preparation, properties and applications. Tantalum powder metallurgy, especially sintering, studied. (H15, Ta)

147-H. (French.) **The Effect of Repeated Cycles Existing on Either Side of the Transformation Points A_3 on the Structure of Rods of Fritted Iron and of Compact Iron.** Georges Cizeron and Paul Lacombe. *Comptes Rendus,* v. 243, no. 14, Oct. 1, 1956, p. 951-953.

Macroscopic excrescences, dislocations and pores developed on samples by transformation from α to γ iron. (H general, N6, Fe)

148-H. (Polish.) **Sintered Magnets of Al-Ni Type.** W. Rutkowski and S. Stolarz. *Prace Instytutow Ministerstwa Hutnictwa,* 1956, no. 3, p. 155-161.

Density, linear contraction, hardness, magnetic properties, coercive intensity and magnetic remanence determined in permanent magnets prepared with and without a protective atmosphere.
(H general, P16, Fe, Ni, Al)

149-H. (Russian.) **Factors Influencing the Normal Setting of Metal Powder During Sintering.** I. M. Fedorchenko. *Zhurnal Tekhnicheskoi Fiziki,* v. 26, no. 9, Sept. 1956, p. 2067-2075.

Investigation of changes in volume during sintering of metal powders. Effect of oxide films, gases and phase transformation. (H15)

150-H. (Russian.) **Sintering of Multiphase Solids. I. Sintering Between Heterogeneous Grains. II. Sintering of Compressed Powder Mixtures. Effect of Concentration on Shrinkage.** B. Ia. Pines and N. I. Sukhinin. *Zhurnal Tekhnicheskoi Fiziki,* v. 26, no. 9, Sept. 1956, p. 2086-2107.

Sintering of different grains and their surface tension. Kinetics of the sintering process. Shrinkage and volume concentration in the mixtures: copper and iron; copper and molybdenum; copper and tungsten; copper and nickel.
(H12, Cu, Fe, Mo, W, Ni)

151-H. Powder Metallurgy. III. Principal Processes Used in Manufacture of Powders. J. F. C. Morden. *Metal Industry,* v. 89, Oct. 19, 1956, p. 329-332.

Twelve methods. (H10, H11)

SECTION J

HEAT TREATMENT

1-J. Work Coils for Induction Heating. D. Warburton-Brown. *Machinery (London),* v. 87, Oct. 28, 1955, p. 1019-1026.

Theory, transformer losses and carrying capacity, cooling, prevention of flash-over, types of coils. Diagrams, graphs, photographs. (To be continued.) (J2)

2-J. Inco Nickel Alloy Helical Springs. II. *Mainspring,* v. 16, Oct. 1955, p. 3-10.

Covers thermal treatment used in the fabrication of spring materials and design recommendations. Tables, graphs, photographs. 3 ref. (J general, T7, Ni)

3-J. Batch-Type Strip Annealing Furnaces. C. F. Olmstead. *Metal Progress,* v. 68, Nov. 1955, p. 91-94.

Advantages of multiple and single-stack cover furnaces for process annealing of strip include lower fuel or power costs, short annealing cycles and more uniform product. Photographs. (J23)

4-J. Mechanized Continuous Furnaces. George C. McCormick. *Metal Progress,* v. 68, Nov. 1955, p. 95-100.

Present machines are classed according to method of handling work and some major considerations are presented which affect a decision to mechanize a heat treating department. Diagrams, photographs. (J general)

5-J. Mechanized Batch-Type Furnaces. Martin Neumeyer. *Metal Progress,* v. 68, Nov. 1955, p. 101-104.

Automation of batch-type furnaces offers better metallurgical control, adaptability and portability, lower cost. Graph, diagrams, photographs. (J general)

6-J. Molten Baths and Mechanisms. L. B. Rosseau. *Metal Progress,* v. 68, Nov. 1955, p. 106-110.

Requirements impose certain restrictions on the design of handling mechanisms; many types of equipment have been developed for all sorts of heat treating operations. Photographs, diagram, table, graph. (J2)

7-J. Design of Special Atmosphere Furnaces and Their Application to Heat Treatment of Metals. I. Jenkins. *Metal Treatment and Drop Forging,* v. 22, Oct. 1955, p. 415-420.

Description of batch-type furnaces, including the bell and pit types: continuous furnaces of the conveyor, pan-conveyor, and roller shaker and rotary-hearth types. Photographs. (J general, J2)

8-J. How to Heat Treat Gray Iron. C. R. Austin. *Modern Castings and American Foundryman,* v. 28, Nov. 1955, p. 30-33.

Four ways to help iron castings meet industrial demands. Diagrams, graphs, photographs, tables. (J general, CI)

9-J. Titanium and Vacuum Heat-Treating Furnaces. Roger R. Giler. *Westinghouse Engineer,* v. 15, Nov. 1955, p. 194-197.

Used with hope that contamination will be reduced or eliminated. Diagrams. (J2, J23, C25, Ti)

10-J. (Russian.) **Heat Treatment of High-Strength Spheroidal Cast Iron.** T. G. Demidova and M. N. Kuniavskii. *Vestnik mashinostroeniia,* v. 35, no. 10, Oct. 1955, p. 30-34.

Effect of annealing temperature and time on graphitization of eutectic and secondary cementite. Process of carbon solution in gamma-phase and transformation of supercooled austenite. Strength, wear resistance, hardness of the cast iron. Micrographs, graphs. 7 ref. (J general, Q general, CI)

11-J. Mechanized Heat Treating—The Growing Trend. O. E. Cullen. *Iron Age,* v. 176, Dec. 1, 1955, p. 99-102.

Advantages and examples of automatic layouts; handling devices and controls. Diagrams, photograph. (J general)

12-J. Short Cycle Heat Treatment Improves Low Alloy Pipe Production. James Kniveton. *Journal of Metals,* v. 7, Nov. 1955, p. 1172-1177.

Equipment, operation lines and mill features which turn out superior high-strength oil-well casing from plain carbon and low alloy steels. Photographs, diagram, table. (J general, Q23, CN, AY)

13-J. Flame Hardened Ductile Irons. C. E. Ernst, R. V. Adair, and G. L. Cox. *Materials & Methods,* v. 42, Nov. 1955, p. 106-109.

Procedures for improving wear resistance and surface hardness up to Rockwell C64. Graphs, diagram, photographs. 2 ref. (J2, CI)

14-J. Suitable Heating and Holding Times in the Commercial Heat Treating of Steel. W. Hülsbruch. *Henry Brutcher Translation No.* 3503, 26 p. (From *Stahl und Eisen,* v. 71, no. 23, 1951, p. 1219-1225.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 18-J, 1952. (J23, Q23, AY)

15-J. (Russian.) **Local Tempering by High-Frequency Currents to Increase Structural Strength of Parts.** O. L. Bendryshev and Ia. B. Fridman. *Metallovedenie i obrabotka metallov,* 1955, no. 2, Aug., p. 33-42.

Relation of shape of area being tempered to shape of inductor and part. Various cooling arrangements; plasticity and toughness of bolts and other parts. Method is effective for improving low - tempered quenched steels. Diagrams, graphs, photographs. 14 ref. (J29, J2, ST)

16-J. (Russian.) **Isothermal Hardening of High-Strength Spheroidal Cast Iron.** V. I. Prosvirin and N. A. Patrina. *Metallovedenie i obrabotka metallov,* 1955, no. 2, Aug., p. 42-50.

Isothermal transformation of austenite; hardness, wear resistance, fatigue strength, other mechanical properties of high strength cast iron in relation to temperature of quenching medium and time. Variations of heat treatment, including tempering, soaking and normalizing, for ferritic and pearlitic cast irons. Tables, graphs. (J26, N8, CI)

17-J. Rapid Radiant Heating of Die Blocks. *Industrial Heating,* v. 22, Nov. 1955, p. 2264, 2266, 2268, 2270.

Furnace employs patterned radiant heat under completely automatic program control. Rapid heating, while maintaining uniform properties, is possible. Graphs, photographs. (J2)

18-J. Preliminary Examination of the Quenching of Titanium Alloys. Leonard D. Jaffe. *Journal of Metals,* v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Nov. 1955, p. 1241-1244.

Thermal diffusivity, under quenching conditions, was found to be approximately 0.006 sq. in. per sec. Quenching severity of the Jominy-Boegehold end quench water jet against titanium alloys appeared effectively infinite. Tables, graphs. 25 ref. (J26, Ti)

19-J. Hardenability of Titanium Alloys Calculated From Composition: A Preliminary Examination. Leonard D. Jaffe. *Journal of Metals,* v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Nov. 1955, p. 1245-1249.

A single graph gives the contributions of each alloying element which can be added to a base hardenability for unalloyed titanium. Results agree satisfactorily with measured hardenabilities. Table, graphs. 24 ref. (J26, Ti)

20-J. The Release of Energy During Annealing of Deformed Metals. L. M. Clarebrough, M. E. Hargreaves and G. W. West. *Royal Society, Proceedings,* v. 232, ser. A, Oct. 25, 1955, p. 252-270 + 1 plate.

Review of mechanisms involved in changes in dislocations and vacancies associated with annealing of deformed nickel and copper and arsenic-copper alloys. Graphs, table. 25 ref. (J23, M26, Ni, Cu)

21-J. Heat Treating Ductile Iron. I. Robert E. Savage. *Steel,* v. 137, Nov. 21, 1955, p. 108-109.

Stress-relief and softening heat treatments. Graph, table. (J1, J29, CI)

22-J. Heat Treating Ductile Iron. II. Robert E. Savage. *Steel,* v. 137, Nov. 28, 1955, p. 109, 112, 114-115.

Hardening treatments, including normalizing, quenching and martempering, all followed by tempering. Induction and flame surface hardening. Graphs, micrographs, table. (J general, CI)

23-J. Heat Treating Gray Iron. III. *Steel,* v. 137, Nov. 7, 1955, p. 134-136.

A continuation of surface hardening processes to include the results achieved from through hardening and hot quenching techniques. Photograph, graphs. (J26, CI)

24-J. The Metallographic View. H. E. Boyer. *Steel Processing,* v. 41, Nov. 1955, p. 716-717.

Effect of composition on hardenability of carbon and alloy steels. Graphs. (J26, M general, CN, AY)

25-J. Flame Hardening — Modern Methods and Equipment. John E. Hyler. *Steel Processing,* v. 41, Nov. 1955, p. 725-730, 733.

Torch capacities for large surfaces; special types of set-ups; burner design; fuels. Hardening procedures for gears. Photographs. (J2)

26-J. Mechanical Properties and Wear Resistance of Gas Cyanided Auto Parts. A. M. Tarasov and B. A. Stetsenko. *Henry Brutcher Translation No.* 3588, 9 p. (Abridged from *Avtomobil'naya i traktornaya promyshlennost,* 1955, no. 3, p. 21-24.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 106-J, 1955. (J28, M27, Q23, Q9)

27-J. Interstage Annealing of 13 Percent Chromium Stainless Steel. Z. Wojcik. *Henry Brutcher Translation No.* 3612, 8 p. (From *Biuletyn informacyjny (Hutnik),* v. 6, no. 2, 1955, p. 5-7.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 134-J, 1955. (J23, N8, SS)

28-J. (French.) **Stabilizing Heat Treatment of Aluminum-5% Magnesium Alloys Against Effects of Heating at Low Temperatures.** André Guilhaudis. *Revue de l'aluminium,* v. 32, no. 224, Sept. 1955, p. 795-801.

Influence of heat treatment on the intercrystalline corrosion properties of A-G5 alloy, from 75 to 125° C. Proposed method and its optimum conditions. Table, graphs, micrographs. 9 ref. (J1, R2, Al)

29-J. (German.) **Present State of Reheating and Annealing Furnaces in Sheet-Rolling Mills.** Otto Schneider. *Stahl und Eisen,* v. 75, no. 22, Nov. 3, 1955, p. 1460-1472.

Furnace control for sheet bar and pack reheating furnaces for hot rolling; annealing of wide strip coils in radiant-tube and directly fired bell-type furnaces, and in continuous furnaces. Diagrams, graphs, photographs, tables. 6 ref. (J23, F21, CN)

30-J. Shopmade Flame-Hardening Machine Improves Shaft Quality. Patrick J. Bruno. *American Machinist,* v. 99, Dec. 19, 1955, p. 128-129.

Machine for treating bars and shafts for machine tools. Photographs. (J2)

31-J. Subzero Treatments for Metals. Thomas A. Dickinson. *Metal Treating,* v. 6, Nov.-Dec. 1955, p. 2-4.

Purposes of cold treatment and methods now in use. Photographs. (J26, ST)

32-J. Heat Treating Cold Forgings. Harry A. Kirkpatrick. *Metal Treating,* v. 6, Nov.-Dec. 1955, p. 6-7.

Practice at Hycon Manufacturing Co., Pasadena. Effective use of heat treatment permits cold forging of fin blades for U. S. Navy rockets. (J general, F22, Al)

33-J. Versatile Carburizing Furnace Pays for Itself in 4 Years. W. H. Weinwurm. *Metal Treating,* v. 6, Nov.-Dec. 1955, p. 8-9.

Used for case hardening over 100 different industrial sewing machine parts, this single heat treating furnace is used for producing case depths that vary from 0.005 to 0.0400 in. Photographs. (J28)

34-J. Controlled Atmosphere Instrumentation. R. R. Swain. *Metal Treating,* v. 6, Nov.-Dec. 1955, p. 12, 14.

Use of fuel-air ratio controller, oxygen recorder and other instruments used in providing uniform prepared atmosphere. Diagrams. (J2, ST)

35-J. Heat Treating to Produce Malleable Iron. James H. Lansing. *Steel,* v. 137, Dec. 19, 1955, p. 106-108, 110.

Standard malleable iron from standpoint of composition, types of furnaces used and methods of heating and cooling. Micrograph, photographs. (J general, CI)

36-J. High Convection Annealing for Wire Coils. James L. Whitten. *Wire and Wire Products,* v. 30, Dec. 1955, p. 1481-1485.

High convection system has made it possible to utilize a great deal more heat by convection transfer to the charges. Method is given for applying this increased fuel input to bell-type annealing furnaces used in the wire industry. Diagrams, photographs, tables. (J23)

37-J. (German and French.) **Heat Treatment of Aluminum and Its Alloys.** B. Mauderli. *Aluminium Suisse,* v. 5, no. 5, Sept. 1955, p. 178-191.

Condition and results of treatment in terms of time and temperature; effect of temperature variations and annealing effects after cold plastic deformation. Graphs, tables, micrographs. 1 ref. (J general, Al)

38-J. (Russian.) **Increase of Wear Resistance of Chromium Coating by**

Carburizing. V. I. Arkharov and V. N. Konev. *Vestnik mashinostroeniia,* v. 35, no. 11, Nov. 1955, p. 55-57.

Details of carburizing chromium plated surfaces by gasoline vapor at high temperature, and the heat and acid resistance of the resulting surfaces. Tables, graph, micrograph. (J28, L17, Q9, Cr)

39-J. Short-Cycle Heat Treatment. Continuous Production Saves Alloys and Time. James Kniveton. *Automation,* v. 3, Jan. 1956, p. 49-52.

Specialized gas furnace design incorporating instantaneous and efficient control of combustion provides for continuous heat treatment in the manufacture of high-strengh pipe. Photographs, diagrams. (J general, ST)

40-J. The Metallographic View. XVII. Practical Application of Hardenability. Howard E. Boyer. *Steel Processing,* v. 41, Dec. 1955, p. 774-775.

Accepted methods for determining hardenability value and its true meaning, factors which influence it as applied to actual practice. Graphs. (J26, ST)

41-J. Materials Handling at High Temperature. *Steel Processing,* v. 41, Dec. 1955, p. 793-796.

Diversified heat treating operations illustrate how modern high-volume heat treating practice is being mechanized with aid of high-alloy castings. Photographs. (J general, A5, ST)

42-J. (Czech.) **Effect of Heat Treatment on Quality of Forged Billets.** Emanual Paral. *Hutnik,* v. 5, no. 7, July 1955, p. 202-204.

Various types of heat treatment for regular and high-quality steels, including recommended procedures for normalizing, isothermal annealing, stress-relieving. (J23, J24, J1, ST)

43-J. (German.) **Thermal Treatment of Temperable Copper-Nickel-Silicon Alloys.** K. Dies. *Metall,* v. 9, nos. 21-22, Nov. 1955, p. 955-959.

Relation between cooling condition and hot hardening; mechanical values and structure at low temperatures. Tables, graphs, micrographs. (J29, Cu, Ni, Si)

44-J. (German.) **New Process of Annealing Brass Strip in Continuous-Heating Furnace.** Th. Münker. *Metall,* v. 9, nos. 21-22, Nov. 1955, p. 967-971.

Construction and operation of furnace and results obtained. Graphs, diagram, photographs. 3 ref. (J23, Cu)

45-J. (Russian.) **Location of Cold Shortness Threshold in Case of Annealing Brittleness.** V. I. Prosvirin and E. I. Kvashnina. *Metallovedenie i obrabotka metallov,* 1955, no. 3, Sept., p. 17-20.

With the origin of annealing brittleness, the threshold of cold shortness is displaced toward higher temperatures. Longer times of high-temperature annealing induces a shift of the cold shortness threshold to lower temperatures but increases grain size. Graphs, micrographs. 4 ref. (J23, Q23, AY)

46-J. (Russian.) **Microstructure of Cast High Speed Tool Steel.** P. M. Iushkevich and S. A. Fedorova. *Metallovedenie i obrabotka metallov,* 1955, no. 3, Sept., p. 21-25.

Changes in structutre during gradual heating up to 1315° C. after quenching in water. Formation of tungstide and carbide inclusions. Micrographs. 8 ref. (J29, M27, TS)

47-J. (Russian.) **Dependence of Anisotropy of Mechanical Properties of Steel on the Annealing Temperature.** Shen' Siao Tsin. *Stal',* v. 15, no. 11, Nov. 1955, p. 1022-1024.

General relationship between anisotropy of a series of steels and conditions of heat treatment, in particular, the temperature and time of annealing. Tables, graphs. 10 ref. (J23, Q general, ST)

48-J. Selective Surface Hardening. J. L. Harris. *Australasian Engineer,* 1955, Oct. 7, p. 45-52.

Four methods of flame hardening, materials suitable for flame hardening, equipment used, results obtained, costs. Diagrams, graphs, tables, photographs. 7 ref. (J28, J2, ST)

49-J. Mechanized Batch Type Furnaces. Martin Neumeyer. *Industrial Heating,* v. 22, Dec. 1955, p. 2444 + 11 pages.

Principal advantages of the furnace include better metallurgical control, flexibility of processing, cost savings in equipment and portability. Photographs, diagrams, tables. (J general)

50-J. Induction Heating Speeds Case Hardening. G. B. Kiner. *Iron Age,* v. 176, Dec. 15, 1955, p. 106-107.

Local hardening to a case depth of 0.030 in. is effectively controlled by an induction heating setup. Scanning spray mechanism case hardens long workpieces evenly. Photographs. (J2, ST)

51-J. Ultrasonics: Effects on Steel Heat Treatment. H. V. Fairbanks and F. J. Dewez, Jr. *Iron Age,* v. 176, Dec. 8, 1955, p. 139-142.

Grain refining effect of ultrasonic energy applied to mild steel

during heat treatment is important theoretically and commercially, since it tends to modify the classical theory of how crystals can be altered. Commercially, ultrasonics provides a new control technique for many heat treating processes. By increasing diffusion rates, sonic energy might greatly speed carburizing, carbonitriding, nitriding and chromizing. Micrographs, diagram, graphs. (J28, ST)

52-J. Modern Reheating and Heat-Treatment Furnace Practice. M. W. Thring. *Metal Treatment and Drop Forging,* v. 22, Dec. 1955, p. 507-514.

Problems of the efficient burning of fuels in heating furnaces and their economic operation. Special reference made to principles of oil firing and methods of improving simple heating systems. Diagrams. 13 ref. (J general, F21)

53-J. Hot-Work Tool Steels. E. Bishop. *Metal Treatment and Drop Forging,* v. 22, Dec. 1955, p. 519-524.

Survey of post-war German developments and the extensive experimental research in softening of such steels during long-period holding at various temperatures within the tempering range. Graphs, tables. 5 ref. (J 29, Q general, TS)

54-J. How to Understand Annealing and Hot Working of Metals. Samuel Storchheim. *Metalworking Production,* v. 99, Dec. 23, 1955, p. 2169-2176.

Basic essentials and theory of hot working and annealing. Graphs, diagrams, micrographs, tables. (J23, F general)

55-J. (English.) **On the Mechanism of Boron Hardenability.** Yunoshin Imai and Hikotaro Imai. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 7, no. 3, June 1955, p. 249-261.

Adsorption of boron atoms on an austenite grain surface appears to fill up lattice defects, thus reducing internal strains. Micrographs, tables, graphs. 11 ref. (J26, AY)

56-J. Atmosphere Controls Boost Heat Treat Output. T. N. Duncan. *Iron Age,* v. 176, Dec. 22, 1955, p. 76-78.

Batch-type furnaces with automatic atmosphere and temperature controls give fewer rejects, better control and doubled production. Diagram, photographs. (J2, ST)

57-J. Heat Treating to Produce Pearlitic Malleable. James H. Lansing. *Steel,* v. 137, Dec. 26, 1955, p. 60-62.

Procedure used in producing pearlitic malleable castings; their properties and applications. Micrographs, table, photographs. (J23, CI)

58-J. Towering Mobile Furnace West's First to Treat 16-Ft. Parts. *Western Metals,* v. 13, Dec. 1955, p. 48-49.

Design and construction of a bottom-loading, bottom-quenching mobile furnace with three-zone temperature control which will enable both fabrication and heat treatment of many aircraft, oil tool, ordnance and automotive parts. Photographs. (J general)

59-J. (Czech.) **Defects During Heat Treatment in Protective Atmospheres.** J. Domorazek. *Strojirenstvi,* v. 5, no. 9, Sept. 1955, p. 693-700.

Classification of protective atmospheres, exothermic and endothermic methods of preparing them. Effects of individual components of atmospheres on steel. Determination of carbon potential. Cause and elimination of defects. Graphs, diagrams. 8 ref. (J2, J general, ST)

60-J. (Russian.) **Rational and Economical Regimes for Annealing Die Blanks of Steel 5KhNT.** N. A. Timchenko. *Metallovedenie i obrabotka metallov,* no. 4, Oct. 1955, p. 32-38.

Recommended cooling and heating periods in annealing furnaces and their relations to hardness. Kinetics of isothermal austenitic transformation. Cooling conditions of surface and interior zones of blanks. Graphs, tables, micrographs. 2 ref. (J23, N8, Q29, TS)

61-J. Residual Stresses and Stress Relieving. R. Weck. *British Welding Journal,* v. 3, Jan. 1956, p. 19-21.

Summary of findings on various aspects of stress and stress relief. Stress relief unnecessary above transition temperature, is, as yet, undetermined. 3 ref. (J1, Q25, ST)

62-J. Heat Treatment Improves Plating on Zinc Die Castings. W. G. Stephenson, Jr. *Products Finishing,* v. 20, Jan. 1956, p. 28-30, 32, 34.

Common defects involved in plate finishing and a new technique to avoid such defects. Micrographs. (J23, L17, Zn)

63-J. A New Method for the Evaluation of High-Vacuum Furnaces and Heat-Treating Atmospheres. W. R. McMillan and Earl A. Gulbransen. Paper from "Vacuum Metallurgy". Electro-Chemical Society, Inc., p. 72-85.

Oxidation studies made on Armco and Puron grades of iron in high vacuum of 10^{-1} mm. of mercury and

in oxygen atmospheres of 1 x 10^{-5} mm. of mercury. Diagram, table, micrographs. 11 ref. (J general, R2, Fe)

64-J. Vacuum Heat-Treating Techniques. Richard L. Hoff and A. M. Bounds. Paper from "Vacuum Metallurgy". Electrochemical Society, Inc., p. 128-141.

Equipment and procedures, future applications, advantages and disadvantages. Photographs, tables, graphs. 8 ref. (J general, Mn, Cu, Cr, Ni, Fe, Ti, Zr)

65-J. Vacuum Annealing of Steel Bars. O. Felgel-Farnholz, H. Sidan, and W. H. Scheibe. *Henry Brutcher Translation No.* 3600, 21 p. (From *Berg- und Hüttenmännische Monatshefte,* v. 100, nos. 7-8, 1955, p. 250-257.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 251-J, 1955. (J23, ST)

66-J. Hardenability of Ductile Cast Iron. C. C. Reynolds, W. T. Whittington and H. F. Taylor. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 116-122.

Method for calculating hardenability from chemical composition. Comparisons of the hardenabilities of ductile iron and steel. Relationship between hardenability, section and severity of quench. Graphs, tables, micrographs. 2 ref. (J26, CI)

67-J. Effects of Trace Amounts of Tin, Lead and Antimony on Annealing of Blackheart Malleable Iron. R. C. Shnay, J. E. Wilson and J. E. Rehder. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 457-465; disc., p. 465.

Lead, tin or antimony have no appreciable effect on first-stage annealing. Tin and antimony act on the rate of second-stage annealing. Micrographs, graphs, tables. 11 ref. (J23, Fe)

68-J. Continuous Heat Treating for Automatic Production. W. J. Behrens. *Industrial Gas,* v. 34, Jan. 1956, p. 17-19, 23-24.

Production rates are decreased, excess handling is eliminated, and closer control of processing made possible. Diagrams, photographs. (J general)

69-J. Induction Hardening. I. D. Warburton Brown. *Machinery Lloyd (Overseas Ed.),* v. 28, Jan. 7, 1956, p. 71-74.

Practical aspects of application of induction heating to hardening problems, equipment, case depth and frequency, power requirements and advantages. Graphs. (J2, ST)

70-J. Heat Treating Steel Castings. Clyde B. Jenni. *Steel,* v. 138, Jan. 23, 1956, p. 84-86, 88.

Heat treatment, along with control of chemical compositions, can be utilized to produce steel castings with desired combination of mechanical properties. Photograph, micrographs, graph, table. (J general, Q general, ST)

71-J. The Development of the Nitriding Process—A Critical Appraisal. G. J. Cox. *Wild-Barfield Heat Treatment Journal,* v. 5, Dec. 1955, p. 2-5.

History of the treatment and some interesting theories. Photographs. 30 ref. (J28)

72-J. New Radiant Gas-Fired Method Speeds Die Block Heating. H. C. Grim. *American Gas Journal,* v. 183, Jan. 1956, p. 23-25.

New furnace heats blocks 4½ times faster, increasing production while consuming 20% less fuel. Photographs, graph, table. (J general, ST)

73-J. Differential Annealing. E. G. Maeder. *Engineering,* v. 181, Jan. 13, 1956, p. 48-52.

Controlled radial variation in temper of circle yields better product with 60% cupping reduction. Annealing process and apparatus. Photographs, diagrams, graphs. (J23, G4)

74-J. Technical Advancements Lead Industrial Heating Equipment Industry to Record-Breaking 1955. Carl L. Ipsen. *Industrial Heating,* v. 23, Jan. 1956, p. 23-24, 26.

Summary of 1955 progress, outstanding new installations. (J general)

75-J. The Status of Combustion in Industrial Furnaces. J. J. Turin. *Industrial Heating,* v. 23, Jan. 1956, p. 28 + 6 pages.

Applications of combustion in industry and related problems. (J general)

76-J. Heat Transfer in Industrial Heating Furnaces: II. M. H. Mawhinney. *Industrial Heating,* v. 23, Jan. 1956, p. 54 + 7 pages.

Data on heating steel, copper and aluminum under various conditions. Tables. (J general, ST, Cu, Al)

77-J. Background for Practical Heat Treatment of Various Titanium Alloy Types. Paul D. Frost. *Journal of Metals,* v. 8, Jan. 1956, p. 35-39; disc. p. 39-42.

Basic mechanisms of hardening, practical application of heat treatments and problems encountered. Tables, graphs. (J general, Ti)

78-J. The Metallographic View. XVIII. Too Much Hardenability. Howard E. Boyer. *Steel Processing,* v. 42, Jan. 1956, p. 23-24.

Accounts for the frequent cracking in sections of parts, made from alloy steels possessing excessive hardenability, during heat treatment, in the stock room or in service. Diagram, graph. (J26, AY)

79-J. Record '55 for Heat Treat Equipment; West's Developments Pace Progress. Carl L. Ipsen. *Western Metal,* v. 14, Jan. 1956, p. 72-73.

New installations in some West Coast plants, among them a system for direct positive, fully automatic means of controlling amount of active carbon in the furnace atmosphere, a newly designed system for martempering long steel aircraft weldments, and a 60-ton per hr., 2000 ft. per min. tin plate annealing line which has twice the speed and capacity of previous systems. Photographs. (J general)

80-J. Electrospark Surface Hardening of Metallic Objects. G. P. Ivanov and N. D. Titov. *Henry Brutcher Translation* No. 3544, 6 p. (Abridged from *Liteinoe proizvodstvo,* 1953, no. 1, p. 21-22.) Henry Brutcher, Altadena, Calif.

Presents the EAI-1 electrosparking machine, its application, economics and effects on microstructure. Tables, diagram, photographs, micrographs. (J28, M27)

81-J. (Russian.) **Formation of Cracks in Case-Hardened Parts and Preventive Measures.** E. I. Malinkina. *Metallovendenie i obrabotka metallov,* no. 5, Nov. 1955, p. 24-28.

Internal cracks, below case, are formed during quenching from gas-carburizing furnace and can be corrected without reheating. Slow tempering avoids external cracks which arise during quenching from low temperatures leading to martensitic structure throughout carburized layer. Surface cracks appear during slow cooling in air, but can be eliminated by changing the cooling rate in upper range of transformation temperatures. Micrographs, photograph. 7 ref. (J26, Q23, AY)

82-J. Induction-Heating. D. Warburton-Brown. *Aircraft Production,* v. 18, Feb. 1956, p. 42-46.

Fundamental principles and problems of application to production processes. Photographs. (J2)

83-J. Heat-Treatment of Welded Alloy Steels. *British Welding Journal,* v. 3, Feb. 1956, p. 52-53.

Table summarizing usual heat treatment practice. Table.
(J general, AY)

84-J. Bright Hardening of Stainless Steels. Fred Hunter. *Industrial Gas,* v. 34, Feb. 1956, p. 14-16.

Versatile high-temperature gas-fired muffle furnace, has upgraded production and has increased overall customer service by achieving economical, commercially practical bright hardening of stainless steels. Diagram, photographs, table.
(J26, SS)

85-J. 1955—A Record Year for the Heat Treating Industry. Carl L. Ipsen. *Iron and Steel Engineer,* v. 33, Jan. 1956, p. 169-170.

Trends in operating procedures and processes in the heat treating of iron and steel.
(J general, ST, Fe)

86-J. Annealing Large Stainless-Steel Weldments. Horace C. Knerr. *Machinery,* v. 62, Feb. 1956, p. 163-166.

Methods of handling and treating large austenitic weldments to remove cold working stresses and put carbides into solution. Photographs. (J23, SS)

87-J. Heat-Treating Parts for the Buick Dynaflow. Herbert Chase. *Machinery,* v. 62, Feb. 1956, p. 179-182.

Describes and illustrates automatic apparatus for heat treating transmission parts. Photographs. (J2)

88-J. Steel Heat Treating Temperatures and Hardness After Treatment. *Materials & Methods,* v. 43, Jan. 1956, p. 127.

Tables giving heat treatment data.
(J general, Q29, ST)

89-J. Tool Steel Annealing. *Metallurgia,* v. 53, no. 315, Jan. 1956, p. 34-36.

Discussion of isothermal annealing and description of furnaces, charging machine and product control features in new British heat treatment plant. Photographs.
(J23, TS)

90-J. Nondestructive Case Depth Measurements. Robert H. McCreery. *Metal Progress,* v. 69, Feb. 1956, p. 70-71.

Depth controlled in production by measuring Rockwell hardness of the surface and comparing it to predetermined limits specified on a series of control charts. Graph. (J28, S18)

91-J. Heat-Treatability of Ti-6Al-4V. R. G. Sherman and H. D. Kessler. *Titanium Metals Corporation of America, Titanium Engineering Bulletin No. 2,* 12 p.

Heat treatment, stress stability, section size, elevated temperature tensile and fatigue studies on material from production ingots of the alloy. Micrographs, graphs, tables.
(J general, Q general, Ti)

92-J. (German.) **The Effect of Alloying Elements on the "Case-Hardenability" of Case-Hardening Steels.** Hans Ulrich Meyer. *Stahl und Eisen,* v. 76, no. 2, Jan. 26, 1956, p. 68-77; disc., 77-78.

Investigation of case hardenability of 23 American and German steels, partly standardized and partly melted on an experimental basis, of the following types: manganese-molybdenum, manganese-chromium, manganese-chromium-molybdenum, manganese-chromium-vanadium, chromium-nickel, nickel-molybdenum and chromium-nickel-molybdenum. Effect of carbon and of alloying elements on case hardenability and on maximum hardness in rim zone. Tables, graphs, diagrams. (J28, AY)

93-J. (German.) **Reduction of the Heat Consumption in the Annealing of Steel Castings.** Gottfried Prieur and Günter Fechner. *Stahl und Eisen,* v. 76, no. 2, Jan. 6, 1956, p. 78-81.

Heat consumption before and after investigations, effect of annealing time, production rate, weight per piece, design of new furnace. Photographs, graphs, diagrams, table. 3 ref. (J23, CI)

94-J. (Russian.) **Properties of Sylvinite as a Medium for Heating in the Quenching of Steel Parts.** E. A. Stol'nikov. *Metallovedenie i obrabotka metallov,* no. 6, Dec. 1955, p. 25-32.

Use of sylvinite in electrode and crucible salt baths as medium for heating in the quenching and normalization processes. Baths with molten sylvinite can be used between 780 and 950° C.; below this range, sylvinite must be mixed with barium or potassium chlorides. Tables, graphs. 6 ref. (J2, CN, AY)

95-J. (Russian.) **Isothermal Quench Hardening of Springs and Coils Made of Steel 55S2.** V. S. Men'shov. *Metallovedenie i obrabotka metallov,* no. 6, Dec. 1955, p. 32-36.

Comparison of mechanical properties of train springs after isothermal quenching and after usual heat treatments. Isothermal quenching eliminates need for tempering and minimizes buckling. Table, micrographs, graphs. 1 ref. (J26, CN)

96-J. (Russian.) **Furnace for Heat Treatment of Metals in Vacuum.** E. N. Marmer. *Metallovedenie i obrabotka metallov,* no. 6, Dec. 1955, p. 36-40.

Design, operation and advantages. Furnace eliminates need for subsequent pickling or mechanical cleaning necessitated by the oxidizing conditions in the usual furnace. Diagram, table. 9 ref. (J2)

97-J. (Russian.) **Method of Gas Carburizing That Employs a Solid Carburizer.** P. I. Shashkin. *Metallovedenie i obrabotka metallov,* no. 6, Dec. 1955, p. 40-44.

Carburizing agent may not be packed densely, but small lumps rest lightly against and around part to be case hardened. Thus, this is still essentially gas cementation. Microstructure, hardness, depth and homogeneity of resulting product. Photographs, micrographs, diagram. 2 ref. (J28, M27, Q29, ST)

98-J. (Russian.) **Intensification of the Carburizing Process in a Solid Carburizer for Automobile Parts.** A. M. Tarasov and M. R. Semenchenko. *Metallovedenie i obrabotka metallov,* no. 6, Dec. 1955, p. 45-51.

Effect of temperature on growth of austenitic grains in alloy steels. Character of heating of parts in carburizing box at 910 and 950° C. Distribution of carbon in carburized layer, hardness and depth of layer. Micrographs, tables, graphs. 3 ref. (J28, N8, AY)

99-J. Modern Furnaces Work as a Team in Aluminum-Fabricating Shop. Charles A. Boz and W. E. Coon. *American Machinist,* v. 100, Feb. 13, 1956, p. 134-135.

A balanced production line consisting of a high-temperature solution-treating furnace, low-temperature aging furnace, quench tank and run-out table connecting the two furnaces, reduces supervision and time-cycle control problems as compared with individual batch furnaces, gives higher quality work because of more uniform heating. Photographs, diagrams. (J27, Al)

100-J. Flame Hardening Upgrades Gears. James P. Bates and C. A. Turner, Jr. *Steel,* v. 138, Feb. 6, 1956, p. 120-121.

Equipment and procedure for gas-air flame hardening to produce high-quality gears economically. Photograph, micrographs, table. (J2, ST)

101-J. Piston Pins Are 100% Surface Hardened for Better Service. R. E. Haislip. *Steel Processing,* v. 42, Feb. 1956, p. 107-110.

A finer grain steel and gas carburizing in a special prepared atmosphere result in shorter production cycle, increased uniformity, greater strength. Carburizing process described. Tables, photographs, diagram. (J28, ST)

102-J. Big Problems Are Commonplace in Flame-Treating Oil Industry Tools. R. F. Arnoldy. *Welding Engineer,* v. 41, Feb. 1956, p. 28-30.

Methods of flame hardening oil industry tools. Photographs. (J2)

103-J. Important Technical Advances Made in Heat Treating of Wire in '55. Carl L. Ipsen. *Wire and Wire Products,* v. 31, Feb. 1956, p. 202, 232.

Highlights summarized. Future trends appear to be centered on increased mechanization and quality control. (J general, F28, S12)

104-J. (Czech.) **Hardening, Heat Treatment and Surface Hardening of Gray and Spheroidal Cast Irons.** Otakar Moravek. *Slévarenstvi,* v. 4, no. 1, Jan. 1956, p. 16-20.

Effect of graphite form and distribution on improving mechanical properties, in addition to improving cast iron quality by hardening and heat treatment, which provides an economical design of high-grade castings. Tables, graph, micrographs. 10 ref.
(J26, J28, Q general, CI)

105-J. (French.) **Construction and Performances of a Vacuum Furnace Capable of Reaching 1450° C.** A. Briot and J. Tourret. *Vide,* v. 10, no. 60, Nov.-Dec. 1955, p. 185-194.

Describes make-up of furnace and applications in the brazing of stainless steel without flux. Photographs, diagrams, tables, graph. 28 ref.
(J general, K8, SS)

106-J. Principles of Heat Treatment of Steels. R. Smith. *Australasian Engineer,* Jan. 1956, p. 61-71.

Basic principles, with particular attention to phase transformations. Discussion of microstructures produced, their formation and properties. Graphs, diagrams, micrographs, table. 19 ref. (J general, M27, CN)

107-J. Heat Transfer in Industrial Heating Furnaces. III. M. H. Mawhinney. *Industrial Heating,* v. 23, Feb. 1956 p. 292 + 7 pages.

Use of curves establishing relation between ratio of heat flow to hearth surface area and ratio of area of heated surface to that of refractories for calculating heat transfer. Graphs, tables. (J general)

108-J. Preheating and Postheating Problems in Repair of Heavy Steel Castings. Charles Berka. *Industry & Welding,* v. 29, Mar. 1956, p. 44-46, 49, 102.

Steps necessary to prepare damaged castings for arc welding; welding method and postheating and cooling. Photographs. (J1, K1, CI)

109-J. Engineered Heat Treating Equipment—A Key to Improved Metallurgical Products. R. W. Brown. *Industrial Heating,* v. 23, Feb. 1956, p. 240-242, 244, 246.

Special furnaces designed to insure consistent and exact conditions necessary for creating maximum alloy properties. Photographs.
(J general)

110-J. Application of Electronic Induction Heating Equipment. I. H. G. Carlson. *Industrial Heating,* v. 23, Feb. 1956, p. 250 + 8 pages.

Some fundamentals of work coil design and determination of power requirement. Diagrams, tables, graphs. (To be continued.) (J2)

111-J. New Annealing Facilities for Ford Motor Co.'s Steel Division. John H. Sprague. *Iron and Steel Engineer,* v. 33, Feb. 1956, p. 101-105.

Installation of modern facilities for annealing cold rolled sheets. Photographs, graphs. (J23)

112-J. The Heat-Treatment of Carbon Tool Steels. A. G. Gardner. *Machinery,* v. 88, Feb. 1956, p. 276-278.

Annealing, stress relieving, hardening and tempering of steels with varying carbon content. Graph, tables. (J general, TS)

113-J. Induction Hardening. II. D. Warburton Brown. *Machinery Lloyd (Overseas Ed.)* v. 28, Feb. 4, 1956, p. 69-71, 73-74.

Progressive heating process and metallurgical considerations involved in induction hardening. Diagrams, graph. (J2, ST)

114-J. Selection and Application of Furnace Atmospheres for Carbon Control. O. E. Cullen. *Metal Progress,* v. 69, Mar. 1956, p. 57-61.

Furnace atmosphere containing about 20% carbon monoxide, 40% hydrogen and 40% nitrogen can be used to carburize, carbo-nitride, recarburize decarburized surfaces, clean, harden or increase the carbon content of strip to a uniform higher level. Requires careful measurement and control of dew point. Diagram, graph, table, photographs. (J2, CN)

115-J. Production Control of Salt Baths in Germany. Otto Schaaber. *Metal Progress,* v. 69, Mar. 1956, p. 67-71.

Potential of bath is measured by immersing mild steel foil long enough to carburize throughout, and estimating carbon content. Quenching power of martempering is measured by time needed to heat a small cylinder through a specified range. Graph, photographs, diagram, table. (J2)

116-J. Application of X-Rays to the Heat Treating Industry. Robert E. Ogilvie. *Metal Treating,* v. 7, Jan.-Feb. 1956, p. 2-5.

Applications of X-ray fluorescent analysis for determining elements

present and X-ray diffraction analysis for determining phases present. Graphs, diagram, photographs. (J general, M22, S11)

117-J. Heat Treating Aircraft Fasteners. Thomas A. Dickinson. *Metal Treating,* v. 7, Jan.-Feb. 1956, p. 6-7.

Dual heat treating setup enables threaded fasteners to be hardened and tempered in such a manner that parts undergo negligible dimensional changes and require a minimum of cleaning prior to electroplating. Photographs, diagram. (J26, J29, L17, ST)

118-J. Heat-Treatment of Titanium-Manganese Alloys. A. Saulnier. *Metal Treatment and Drop Forging,* v. 23, Feb. 1956, p. 63-66.

Summary of recent French research on structural transformations of titanium-alloys with 7% Mn and with 4% Mn and 4% Al. Graph, micrographs. (J26, J29, N6, Ti, Mn)

119-J. Scale-Free Heating in a Direct-Fired Furnace. Horace Drever. *Steel,* v. 138, Mar. 5, 1956, p. 105-106.

Principles of the Equiverse furnace where the burners which do the heating also create a scale-free atmosphere when operating up to 2350° F. Photograph, graphs. (J2, ST)

120-J. Controlled Low-Temperature Stress Relieving of Pressure Vessels. T. W. Greene and C. R. McKinsey. *Welding Journal,* v. 35, Mar. 1956, p. 145s-152s.

Tests indicate that controlled low-temperature stress-relieving process is a practical method of stress-relieving large structures, field erected tanks and final assembly welds of pressure vessels. Graphs, diagrams, photographs, tables. 4 ref. (J1, ST)

121-J. (German.) **Removal of Carbon From Over-Saturated Solutions in α-Steel During Precipitation.** Wolfgang Pitsch and Kurt Lücke. *Archiv für das Eisenhüttenwesen,* v. 27, no. 1, Jan. 1956, p. 45-54.

Attenuation and electric resistance dependence of over-saturated and of precipitated carbon in alpha steel. Separation course at 90 to 70° C. in deformed and nondeformed wires, after quenching at 710° C. Graphs, tables, diagram 28 ref. (J26, N8, ST)

122-J. (German.) **Investigation of Usefulness of Sulfite-Cellulose Liquor as a Cooling Agent in Heat Treatment of Steel.** R. Mitsche and E. Bierbrauer. *Berg- und hüttenmännische monatshefte der monanistischen Hochschule in Leoben,* v. 101, no. 1, Jan. 1956, p. 12-18.

Especially applicable in the case of construction steels. Tables, graphs. 2 ref. (J2, ST)

123-J. (Russian.) **Low-Temperature Tempering of Wire for Prestressed Concrete and Cables.** L. V. Beloruchev. *Stal',* v. 16, no. 1, Jan. 1956, p. 56-62.

Tempering procedure results in improved mechanical properties, including resistance to relaxation of stresses, and the elimination of stresses leading to the untwisting of cables. Tables, graphs. 8 ref. (J29, ST)

124-J. Experimental Investigation of Low-Temperature Stress-Relieving Methods Applied to Penstocks. Minoru Okada and Masaki Watanabe. *British Welding Journal,* v. 3, Mar. 1956, p. 788-83.

Experimental investigation of the application of low-temperature stress-relieving methods to penstocks. Part of a larger project designed to produce a standard code for welded penstocks. Diagrams, graphs. (J1, Q25)

125-J. Practical Hints on the Annealing of Strip Steel. A. E. Nygren. *Henry Brutcher Translation No.* 3660, 8 p. (Condensed from *Värml. Bergsm. Fören. Annaler,* 1953, p. 108-137.) Henry Brutcher, Altadena, Calif.

Hardness as function of time of annealing hypo and hypereutectoid steels at different temperatures; effects of spheroidizing temperature and cooling rate. Table, graphs. (J23, ST)

126-J. (German.) **Inductive Surface Quenching of Nodular Cast Iron.** Wener Malmberg. *Giesserei,* v. 43, no. 4, Feb. 16, 1956, p. 81-85.

Types of induction heating, quenching experiments with pearlite and ferrite irons. Graphs, micrographs. 6 ref. (J26, J2, CI)

127-J. New Furnace Combines Annealing, Vacuum Degassing. *Iron Age,* v. 177, Apr. 12, 1956, p. 102-103.

In heat treating where metal degassing is a factor, vacuum furnaces offer a number of distinct advantages. Photograph. (J2, J23)

128-J. Stabilization of Aluminum Alloy Castings. G. B. Olson. *Metal Progress,* v. 69, Apr. 1956, p. 79-80.

To obtain the precise dimensional tolerances required for instrument components, aluminum alloy castings are stabilized by treatment at both −150 and 450 to 475° F. Stabilization does not affect mechanical properties or corrosion resistance. Diagram, photograph, table. (J1, Al)

129-J. Gas Carburizing Under Pressure. (Digest of "Gas Carburizing Under Pressure", by O. P. Sorokina and D. I. Bron; *Metallovedenie i Obrabotka Metallov,* no. 1, 1955, p. 47-50.) *Metal Progress,* v. 69, Apr. 1956, p. 170, 172.

Two carburizing processes were studied, one that takes place at the interface between the metal and the carburizing medium, another that occurs in the steel itself. Experiments show that higher pressures accelerate the process of saturation of the surface layer of the steel with carbon. Graph. (J28, ST)

130-J. On the Nature of Spottiness in a Chrome-Molybdenum-Aluminum Nitriding Steel. V. D. Oreshkin. *Henry Brutcher Translation No.* 3598, 5 p. (From *Stal,* v. 15, no. 1, 1955, p. 69-70.) Henry Brutcher, Altadena, Calif.

Spottiness in 38KhMYuA steel is like a segregation which has its origin in local carbon enrichment of the ingot and is mainly due to contamination by nonmetallic inclusions. Diagrams, micrographs. (J28, AY)

131-J. Surface Hardening of Machine Parts by the Electrospark Process. L. A. Mirkin. *Henry Brutcher Translation No.* 3630, 11 p. (From *Vestnik Mashinostroeniya,* v. 35, no. 4, 1955, p. 48-51.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 110-J, 1955. (J28, ST, CI)

132-J. Electrospark Surface Hardening of Machine Details. A. V. Polyachenko. *Henry Brutcher Translation No.* 3640, 15 p. (From *Vestnik Mashinostroeniya,* v. 34, no. 7, 1955, p. 65-70.) Henry Brutcher, Altadena, Calif.

Surface hardening of carbon steels and gray iron by electrosparking, using cemented-carbide electrodes of different compositions (tungsten carbide plus various cobalt contents and different titanium carbide additions). Effects on mechanical properties; applications. Tables, graphs, micrographs. 5 ref. (J28, Q general, CN, CI)

133-J. How to Heat Treat Beryllium Copper. Anthony Sorrentino. *Industrial Heating,* v. 23, Apr. 1956, p. 699 + 8 pages.

Parts are formed or machined in a relatively soft condition, then given a low-temperature heat treatment to produce maximum properties. Process offers flexibility of design. Micrographs, photographs, graph, tables. (J general, Cu)

134-J. Mechanized Continuous Furnaces. II. George C. McCormick. *Industrial Heating,* v. 23, Apr. 1956, p. 708 + 5 pages.

Several types of mechanized continuous furnaces; considerations for mechanizing a process. Diagrams, photographs. (J general)

135-J. Modern Case-Hardening Processes. P. F. Hancock. *Iron and Steel,* v. 29, Mar. 1956, p. 87-93.

Brief review of case hardening processes, with emphasis on those in which major developments have occurred in recent years. Diagrams, graphs, photographs. (J28)

136-J. Some Effects of Micro-Segregation. H. Allsop. *Iron and Steel,* v. 29, Mar. 1956, p. 95-98, 103.

Many types of stubs were examined and conclusions are based on a large number of Jominy end-quench curves representing the hardenability at the surface and various internal positions in a variety of large bars. (To be continued.) Graphs, photographs. (J26, M27, ST)

137-J. The Tempering and Nitriding of Some 3% Chromium Steels. C. C. Hodgson and H. G. Baron. *Iron and Steel Institute, Journal,* v. 182, Mar. 1956, p. 256-265.

Response to nitriding of a series of steels of the En 40 type was investigated, with particular reference to the effect of previous heat treatment and of carbon and vanadium content. Hardness readings were taken after tempering and depth-hardness curves were plotted after nitriding. Diagram, graphs, tables. 11 ref. (J28, J29, Q29, ST)

138-J. (French.) **Heat Treatment in Controlled Atmosphere.** *Métallurgie,* v. 88, no. 3, Mar. 1956, p. 261, 263-265, 267.

Various types of atmospheres to be used with copper and steel; conditions of use; gaseous cementation. Tables, diagrams, photographs, graphs. (J2, J28, ST, Cu)

139-J. (German.) **Cr-Ni Case Hardened Steels According to DIN 17210 in Comparison With DIN 1662 Steels.** Heinz Kiessler. *Schweizer Archiv für Angewandte Wissenschaft und Technik,* v. 22, no. 3, Mar. 1956, p. 93-96.

Comparative survey of the two standardized German steels. Tables, graphs. 5 ref. (J28, ST)

140-J. Commerical Bright Hardening of Stainless Steels. *Canadian Metals,* v. 19, Apr. 1956, p. 51-52.

Investigation of potentialities of a high-temperature, gas-fired, muffle furnace. Photograph. (J26, SS)

141-J. Current Trends in Heat Treating Light Metals. George H.

Thurston. *Light Metal Age,* v. 14, Apr. 1956, p. 14-15.

Automatic handling, use of salt bath furnaces, various heat treating problems. (J general, A5, A1)

142-J. Dimensional Control Through Heat Treat. John W. Greve. *Tool Engineer,* v. 36, May, 1956, p. 119-124.

Heat treat distortion can often be economically compensated in large production runs. Steps to consider in this problem. Table, diagrams, photographs. (J22, J26)

143-J. Resistance and Induction-Heated Furnaces. Paper from "High-Temperature Technology". John Wiley & Sons. p. 259-332.

Graphite resistor furnace, tungsten and oxide resistor heating elements, high-vacuum furnace, arc furnaces, methods of achieving high temperatures. Diagrams, graphs, photographs, tables. 80 ref. (J general)

144-J. Means of Achieving High Temperatures and Some of Their Limitations. E. M. Sherwood. Paper from "High-Temperature Technology". John Wiley & Sons. p. 251-258.

Resistor furnaces, induction-heating equipment, and arc furnaces as means for producing elevated temperatures. Table. 49 ref. (J general)

145-J. (German.) **Annealing of Malleable Cast Iron in a Gas Atmosphere.** Karl Roesch and Hellmut Friederichs. *Giesserei,* v. 43, no. 8, Apr. 12, 1956, p. 177-180.

Practical application of equilibrium diagrams during annealing in CO-CO_2-H_2-H_2O mixtures. Description and operation of annealing furnaces. Diagrams, photographs. 4 ref. (J23, N8, CI)

146-J. (Russian.) **Carburizing Middle-Alloy Carbon Steel.** E. M. Morozova and A. P. Skuzovatova. *Stanki i Instrument,* v. 27, no. 3, Mar. 1956, p. 26-29.

Strength of carburized parts in relation to carbon content of steel, depth of carburized layer, strength of core, other factors. Hardness in relation to depth of carburized layer. Recommendations of specific steels. Graphs, tables. 2 ref. (J28, Q23, Q29, AY, CN)

147-J. Heat Treatment of Gray Cast Iron. A. H. Rauch and J. B. Peck. *American Foundrymen's Society, Preprint No.* 56-25, 1956, 5 p.

Hardenability of both alloyed and unalloyed irons in the strength range of ASTM Class 25 to Class 35 irons determined by end-quench hardenability test. Effect on hardenability of chromium, nickel and molybdenum, singly and in combination. Conventional Rockwell-C and Brinell tests made on heat-treated gray iron are an integration of the hardness of the graphite and metal matrix. Diagram, graphs, tables. 13 ref. (J26, Q29, CI)

148-J. Measurement of Stress-Relieving Temperatures of Some Power Plant Steels. J. D. Murray. *Metal Treatment and Drop Forging,* v. 23, Apr. 1956, p. 131-134.

Method for determining stress-relieving temperature, giving examples of results on some low-alloy molybdenum and chromium-molybdenum steels, and high-alloy steel. Diagram, graphs, photograph, tables. 4 ref. (J1, AY)

149-J. Effect of Sampling Tube Material on Dew Point Measurements. P. C. Kirby. *Metal Treatment and Drop Forging,* v. 23, Apr. 1956, p. 153-155.

Some experiments which show the effect of various materials used for the sampling tubes in dew-point measurements for control of atmospheres in heat treatment operations. Graphs. 1 ref. (J2)

150-J. (Japanese.) **On the Case Hardening of Steels by Modified Gas Utilizing O_2. II. In the Case of Using CO_2.** Naoto Shirai. *Iron and Steel Institute of Japan, Journal,* v. 41, no. 4, Apr. 1956, p. 424-429.

Steels of various kinds were heated in a closed vessel containing carbon dioxide and potassium ferrocyanide, and both the powerful carburizing action of the formed atmosphere and the reaction between the cyanide salt and carbon dioxide were studied. Graphs. 2 ref. (J28, ST)

151-J. (Russian.) **High-Frequency Heat Treatment of Camshafts.** S. N. Sizov. *Avtomobil'naia i Traktornaia Promyshlennost',* no. 3, Mar. 1956, p. 32-35.

Recommended frequencies, heating time, cooling conditions, and the like, in the induction heating and hardening of tractor cams and camshafts. Depth and structure (martensite, troostite-martensite, troostite-sorbite zones) of case. Tables, diagrams, photograph. 3 ref. (J2, CN)

152-J. (Russian.) **Quench-Hardening of Machine Tools Made of High Speed Steels Whose Cross Sections Differ Greatly in Dimensions and Profile.** R. P. Leshchinskaia. *Metallovedenie i Obrabotka Metallov,* no. 3, Mar. 1956, p. 34-46.

Problem of cracking as a result of complex shape of parts is prevented by carefully regulated heating and cooling, particularly in the zone of martensite transformation. Photograph. 6 ref. (J26, N8, TS)

153-J. (Russian.) **Formation of Aluminum Nitride During Nitriding.** A. A. Iurgenson. *Metallovedenie i Obrabotka Metallov,* no. 3, Mar. 1956, p. 50-52.

X-ray and chemical analyses. Plasticity, microstructure, and hardness of nitrided aluminum. Failed to find aluminum nitride after prolonged nitriding of pure aluminum (up to 930 hr.). Micrographs, 3 ref. (J28, M27, Q23, Q29, Al)

154-J. Age-Hardening Characteristics of a Cast Alloy of Copper—5.8 Per Cent Titanium. N. Hehner, H. McCurdy and R. Edelman. *American Foundrymen's Society, Preprint No.* 56-1, 1956, 4 p.

Optimum mechanical properties for a cast 5.8% Ti copper alloy were obtained after solution treating at 1625° F., water quenching, and then age-hardening at 800° F. Diagram, graphs, micrographs, table. 13 ref. (J27, Q23, Cu, Ti)

155-J. Heat-Treatment Technique. J. W. Oppy. *Australasian Engineer,* Mar. 1956, p. 64-67.

Outline of heat treatment techniques for the steels more commonly used in general engineering practice. Tables. (To be continued.) (J general, ST)

156-J. Selection of Steel for Heat Treatment. K. G. Morrison, *Australasian Engineer,* Feb. 1956, p. 64-67.

Tool and die steels and steels used for the automobile steering knuckle are especially considered. Table. 2 ref. (To be continued.) (J general, T21, TS, AY)

157-J. Heat Treating Retaining Rings for Jet Engines. Arthur G. Portz. *Industrial Heating,* v. 23, May 1956, p. 985 + 4 p.

Production steps in normalizing, hardening and tempering large stainless steel rings. Photographs, table, micrographs. (J general, SS)

158-J. Automatic Carbon Control for Batch-Type Furnaces. T. N. Duncan. *Steel Processing,* v. 42, May 1956, p. 283-287.

Furnace, generator and atmosphere control are fully automatic, requiring work handling only for loading and unloading the tray. Tables, micrographs, photographs, diagram. (J2, ST)

159-J. Furnace For Heat Treatment of Metals in Vacuum. E. N. Marmer. *Henry Brutcher Translation No.* 3703, 7 p. (From *Metallovedenie i Obrabotka Metallov,* v. 1, no. 6, 1955, p. 36-40.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 96-J, 1956. (J2)

160-J. (English.) **Heat-Treatment of Forged Roll Steel.** Yunoshin Imai and Shoshiro Ohara. *Science Reports of the Research Institutes, Tohoku University,* ser. A., v. 7, no. 5, Oct. 1955, p. 469-481.

To determine the conditions of heat treatment favorable to a roll steel containing 0.80% carbon and 1.62% chromium, austempering and martempering were studied. Graphs, tables. (J26, N8, AY)

161-J. (Dutch.) **Middle-Frequency Induction Hardening of Steel.** J. W. Geurts. *Smit Mededelingen,* v. 11, no. 1, Jan.-Mar. 1956, p. 21-25.

Power requirements, selection of steel, initial microstructure, carbon content, residual stresses, distortion. Graphs, photographs. (J2, M27, Q25, ST)

162-J. The Distortion and Dimensional Instability of Heat-Treated Components. W. B. Kemmish. *Machinery (London),* v. 88, May 18, 1956, p. 759-764.

Principles of heat treatment of tool steel, causes of dimensional changes, recommendations for avoiding some engineering troubles and production losses. Graphs, micrographs. (J general, TS)

163-J. Carbonitriding of Small Parts. J. McMullen and D. R. McHarg. *Metal Treatment and Drop Forging,* v. 23, May 1956, p. 179-184.

Construction and operation of a plant for the heat treatment and case hardening of components for accounting and calculating machines. Micrographs, diagram, photographs, table. (J28, CN)

164-J. Here's How to Stress Relieve in the Field. Ronald E. Cannon. *Petroleum Processing,* v. 11, June 1956, p. 74-75.

Six steps to follow; necessary equipment. Diagram, graph, tables. (J1)

165-J. (Czech.) **Hardness and Depth of Nitrided Layer of Cutting Tools.** R. Malik. *Strojirenstvi,* v. 6, no. 3, Mar. 1956, p. 196-199.

Importance of correct thickness of nitrided layer; depth of penetration; basic conditions for obtaining maximum hardness. Graphs. (J28, TS)

166-J. (Czech.) **Determining the Carburizing Efficiency of Various Atmospheres.** J. Zboril and I. Sala. *Strojirenstvi,* v. 6, no. 5, May 1956, p. 327-330.

Principles and advantages of various methods, device for testing various atmospheres, relation between electrical resistance and carbon contents. Graphs, diagram, photograph, micrographs. 5 ref. (J28, J2, ST)

167-J. (French.) **Continuous Furnace With Strong Air Stream for the Heat Treatment of Light Metals.** J. Hérenguel, F. Santini and M. Scheidecker. *Revue de Métallurgie,* v. 53, no. 3, Mar. 1956, p. 161-168; disc., p. 168-169.

Metallurgical advantages, with particular reference to restoration annealing, quenching and tempering; design conditions. Photographs, graphs. 4 ref. (J general, EG-a)

168-J. Isothermal Quenching in Salt Increases Tool Life. Diego Straniero. *American Machinist,* v. 100, June 18, 1956, p. 126-128.

A prolonged isothermal treatment in salt baths, much like martempering, improves the life of high-carbon, low-chromium drills by 5 to 7 times. Table, diagram, micrographs, graphs. (J26, TS)

169-J. Modern Case-Hardening Processes. P. F. Hancock. *Birmingham Metallurgical Society, Journal,* v. 36, Mar. 1956, p. 360-381.

Gas carburizing, control of case characteristics, furnaces, carbonitriding, induction and flame hardening, metallurgical considerations, practical applications and equipment. Table, photographs, diagrams, graphs, chart, (J28, ST)

170-J. Stress Relief Heat Treatment Equipment for Welds of All Kinds. K. Frauenfelder. *Brown Boveri Review,* v. 43, nos. 1-2, Jan.-Feb. 1956, p. 48-57.

A process based on the principle of induction heating which, using very simple equipment and requiring no costly brick furnaces, enables welds of all kinds to be treated on large or small workpieces. Photographs, table, diagram, graph. (J1)

171-J. Foundry Practice. XI. Heat Treatment. William H. Salmon and Eric N. Simons. *Edgar Allen News,* v. 35, May 1956, p. 101-102.

Annealing treatments to produce malleable irons and treatments involving rapid cooling. Micrographs, tables. (To be continued.) (J23, CI)

172-J. Normalizing and Quench-and-Temper Heat Treatment of Steel Products. James MacGregor. *Iron and Steel Engineer,* v. 33, May 1956, p. 108-115; disc., p. 115-119.

Furnace mechanical equipment for heat treating of tubular products. Normalizing furnace rotates the product. Diagrams, photographs. (J24, J26, J29, ST)

173-J. How to Heat Treat Titanium. Walter L. Finlay, W. W. Wentz and D. W. Kaufmann. *Materials & Methods,* v. 43, June 1956, p. 126-131.

How to take fullest advantage of titanium's inherent strength by means of quench-age heat treating cycles. Graphs, tables. (J26, J27, Ti)

174-J. Titanium Alloy Reclamation by Vacuum Annealing. D. N. Williams, R. I. Jaffee and C. A. Bentley, Jr. *Metal Progress,* v. 69, June 1956, p. 57-59.

Excessive hydrogen content can cause embrittlement and thermal instability of titanium alloys. Annealing in a vacuum furnace will reduce hydrogen contamination and restore ductility. Photograph, micrograph, table. (J23, Ti)

175-J. Effect of Molybdenum in Iron and Steel. Alvin J. Herzig. *Metal Progress,* v. 69, June 1956, p. 72-75.

Early studies on hardenability, effect on creep strength, research on temper brittleness, machinability, role of molybdenum in cast iron. Diagram. (J26 Q general, Mo, CI, AY)

176-J. Development and Application of the Iso-Hardness Diagram. A. E. Gurley and C. R. Hannewald. *Metal Treating,* v. 7, May-June, 1956, p. 2-6, 32-33.

Method for clearly evaluating carburized hardenability data. Graphs. (J26, J28, CN)

177-J. Controlled Atmosphere Heat Treating and Equipment. II. F. E. Harris. *Metal Treating,* v. 7, May-June 1956, p. 8-10, 30.

Construction and operation of furnaces. Diagram, photographs, graphs. (J2, CN)

178-J. Induction Heating Handling Problems. D. Warburton Brown. *Welding and Metal Fabrication,* v. 24, June 1956, p. 207-211.

Essential components of an induction heating system; evolution of a handling fixture; rotary motion. Diagrams. (To be continued.) (J2)

179-J. (Czech.) **Efficacious Method for Calculation of Jominy Curves and the Zone of Annealability.** Fr. Labonek. *Strojirenstvi,* v. 6, no. 3, Mar. 1956, p. 185-190; disc., p. 191-193.

Results indicate that mathematical methods do not provide a reliable basis for Jominy curves and for determining hardenability bands. Only experimental tests furnish correct data. Tables, graphs, diagram. 14 ref. (J26, ST)

180-J. Heat-Treatment Technique for Constructional Steels. V. A. Sharp. *Australasian Engineer,* v. 48, Apr. 1956, p. 63-66.

Selection of equipment, quenching and its mechanism. (J general, T26, ST)

181-J. Heat Treating Alloy Steels for Heavy Duty Axle Service. T. A. Frischman. *Automotive Industries,* v. 114, June 15, 1956, p. 50-51.

Case hardening and annealing of several alloys; composition and properties. (J26, J28, AY)

182-J. Heat Treatment of Copper and Aluminum Wire. H. J. Miller. *Industrial Heating,* v. 23, June 1956, p. 1161 + 4 pages.

Five different heating methods used to satisfy annealing requirements for copper wire. (To be continued.) (J22, F28, Cu, Al)

183-J. The Rapid Unloader as Used in Conjunction With Induction Heating. Ellis J. Gottlieb. *Industrial Heating,* v. 23, June 1956, p. 1170, 1172, 1174, 1176.

Mechanism uses a series of cam-driven fingers to load and unload the induction heating coil. (J2, A5)

184-J. Batch Type Strip Annealing Furnaces—Multiple and Single Stack. II. C. F. Olmstead. *Industrial Heating,* v. 23, June 1956, p. 1201 + 10 pages.

Use of radiant tube single-stack furnace means a minimum of product inventory, rapid heating, economical loading and little floor area required per ton of product heated. (J23, ST)

185-J. Get Top Quality Carburizing With Zone Control. H. C. Harris. *Iron Age,* v. 177, June 21, 1956, p. 107-109.

Gas carburizing with zone controlled atmospheres is applied to the continuous production of steel gears. (J28, AY)

186-J. Commercial Bright Hardening of Stainless Steels. Fred Hunter. *Steel Processing,* v. 42, June 1956, p. 347-349.

Treatment of stainless and tool-steels in high-temperature muffle furnace results in fewer rejects, considerable savings and product improvement. (J26, J2, SS)

187-J. Versatile Allcase Furnace. James B. Smith. *Western Metals,* v. 6, June 1956, p. 58-59.

With gas-fired atmospheric batch-type furnace, distortion is minimized, batch heat treating can be used with any grade of steel, and automatic controls create a high production operation, easily handled by one man. (J general, ST)

188-J. Continuous Electric Furnaces. *Wild-Barfield Heat Treatment Journal,* v. 5, June 1956, p. 10-13.

Some furnaces suitable as electric furnaces. (J general)

189-J. (Czech.) **Economical Nature of Induction Heating in Modern Forge Shops.** E. Langer. *Strojirenstvi,* v. 6, no. 1, Jan. 1956, p. 32-35.

Advantages of induction heating, choice of right frequency, effective decrease in amount of surface scale formed. Soviet auto industry experiences. (J2, F22, ST)

190-J. (Russian.) **Thermal Electric-Spark Hardening of Machine Parts.** I. I. Kichkin. *Vestnik Mashinostroeniia,* v. 36, no. 5, May 1956, p. 65-68.

Suggests method of electric-spark hardening of metallic surfaces followed by an electric-arc heat treatment of the hardened surface which provides an additional protective layer beneath the initial one. (J2, ST)

191-J. Austempering Shovel Blades. H. Chapman. *Canadian Metals,* v. 19, June 1956, p. 46, 48, 50.

Thin-section carbon steel responds to this technique as satisfactorily as it does to hardening and tempering. (J26, CN)

192-J. Recent Heat Treatment Furnace Installations. *Metallurgia,* v. 53, no. 320, June 1956, p. 257-275.

A review with some typical examples. (J general)

193-J. Deep Freeze Your Casting for Stress Relief. *Precision Metal Molding,* v. 14, July 1956, p. 51-52.

Pent-up stresses that would distort the casting ordinarily are relieved by freezing. Machining is simplified. (J1, J26, Al)

194-J. (Czech.) **Stepwise Flame Hardening of Gears.** A. Strachota. *Strojirenska Vyroba,* v. 1, no. 4, Apr. 1956, p. 21-26.

New Czech instrument has heating tip that fits down along each individual gear tooth. The advantage is a very even depth of hardening for crest and trough of each tooth, while the core of the tooth still re-

mains tough. Method results in better fatigue limits and less brittleness. Design and operation features. (J2, ST)

195-J. (Czech.) **Equipment and Techniques for Induction Heating.** J. Paukner. *Strojirenska Vyroba,* v. 4, no. 2, Feb. 1956, p. 70-76.

Survey of Czech and Soviet instruments, machines and techniques for induction heating, hardening, annealing, forging operations and welding and similar operations. (J2)

196-J. (Russian.) **Effective Procedures for Quench-Hardening Large Forgings of Structural Steel.** A. A. Astaf'ev and K. A. Ermakov. *Metallovedenie i Obrabotka Metallov,* 1956, no. 4, Apr. 1956, p. 35-45.

Mechanical properties of the steel in relation to temperature and time of isothermal transformation. Kinetics to transformation of supercooled austenite. Quenching temperatures and media.
(J26, N8, Q general, AY-n)

197-J. (Russian.) **Induction Heating of Intermediate Products of Heat-Resistant Alloy EI437 for Die Stamping.** I. I. Bezruchko, Ia. M. Ditiatkovskii and M. S. Aizikovich. *Metallovedenie i Obrabotka Metallov,* 1956, no. 4, Apr. 1956, p. 58-60.

Current frequency, heating temperature, depth of current penetration and other factors in heating of alloy from which turbine blades are to be stamped. (J2, SS-h)

198-J. (Russian.) **Determination of Hardenability of Chromium-Manganese Tool Steel.** V. V. Polovnikov. *Zavodskaia Laboratoriia,* v. 22, no. 5, May 1956, p. 565-567.

Quantitative relationship between stability of austenite in, and hardenability characteristics of, toolsteel. Problem of uniformity of methods involved in determination of each of these properties. (J26, N8, TS)

199-J. Reduce Gear Distortion With Mass Marquenching. E. A. Schoefer. *Iron Age,* v. 178, July 19, 1956, p. 107-109.

A new carburizing and heat treating installation combines maximum part quality with a minimum of distortion. Carburizing is achieved in a closely controlled gas atmosphere to provide optimum carbon gradient. (J26, ST)

200-J. Cored Inductors for Induction Heating. II. D. Warburton Brown. *Machinery Lloyd (Overseas Ed.),* v. 28, June 23, 1956, p. 70-71, 73-76.

The use of cored inductors in various methods of hardening. (J2)

201-J. Enhanced Properties in 17-7 Stainless. M. W. Marshall, D. C. Perry and N. R. Harpster. *Metal Progress,* v. 70, July 1956, p. 94-98 + one data sheet.

High strength-weight properties of 17-7 stainless steel with aluminum, hardened partially by martensitic transformation at −100° F. and further by aging at 950° F., are very useful for aircraft and missile parts working up to 800° F.
(J26, J27, SS)

202-J. Control of Controlled Atmospheres. D. J. Schwalm. *Metal Progress,* v. 70, July 1956, p. 99-102.

Measurement of the carburizing potential of furnace atmospheres is more accurate if infra-red analysis of carbon dioxide is used.
(J2, S11)

203-J. (Czech.) **New All-Purpose Machine for Surface Flame Hardening. New Techniques.** Jar. Gabriel. *Strojirenska vyroba,* v. 4, no. 4, Apr. 1956, p. 157-161.

Advantages of surface hardening and range of application. Description and uses of new machine, its advantages over previous flame-hardening methods and apparatus. (J2)

204-J. (Hungarian.) **The Degree of Dissociation of Ammonia Gas in Nitriding Processes.** Tiborné Tömöry. *Kohaszati Lapok,* v. 9, no. 5, May 1956, p. 199-206.

Influence of catalysts on the dissociation. Modification of the properties of the nitrided layer by varying the composition of the gas mixture. (J28)

205-J. Practical Aspects in the Heat Treatment of High-Alloy Tool Steels. C. J. Thompson. *Australasian Engineer,* v. 48, May 1956, p. 50-55.

Annealing, hardening and tempering, special treatments.
(J general, TS)

206-J. Temperability of Steels. Leonard D. Jaffe and Edward Gordon. *California Institute of Technology, Jet Propulsion Laboratory, Memorandum No.* 20-120, Mar. 1956, 47 p.

Method for calculating, from the composition of a steel, the temperature required to temper it to a desired hardness after quenching to martensite, is based on statistical analysis of hardness measurements on about 5000 samples from laboratory heats. (J29, ST)

207-J. Heat Treatment of Copper and Aluminum Wire. II. H. J. Miller. *Industrial Heating*, v. 23, July 1956, p. 1422, 1424.

Annealing procedures. (J23, Cu, Al)

208-J. Huge Car-Type Furnace of Adjustable Length For Heat Treating at Temperatures Up to 2200° F. *Industrial Heating*, v. 23, July 1956, p. 1388, 1390, 1392, 1532.

Details on construction, burners and temperature control. (J1, J23)

209-J. Interchange Induction Coils to Meet Job Needs. D. H. Otto. *Iron Age*, v. 178, July 26, 1956, p. 66-68.

Interchangeable high-frequency work coils boost heating efficiency and set high standards in quality and uniformity. (J2, ST)

210-J. Continuous Furnace Cuts Small Part Hardening Costs. Herbert Chase. *Iron Age*, v. 178, July 26, 1956, p. 70-71.

Less costly, more uniform case hardening resulted from installation of a continuous batch-type carbonitriding furnace; operator loads part trays, furnace does the rest. (J28, ST)

211-J. Heat Treating Thousands of Aluminum Parts Per Day. C. A. Boz and W. E. Coon. *Modern Metals*, v. 12, July 1956, p. 40, 42.

Aluminum fin-blades for guided missiles are solution heat treated and artificially aged at rates of thousands per day. (J27, Al)

212-J. (Czech.) **Rapid Heating of Steels.** Bedrich Bukovsky. *Hutnik*, v. 6, no. 3, Mar. 1956, p. 66-70.

Theoretical results of rapid heating. Heating temperature is dictated by carbon content, amount of impurities and inclusions and degree of nonhomogeneity. Effect of rapid heating on thermal conductivity, specific heat, thermal expansion, modulus of elasticity, toughness and other mechanical properties. (J2, Q general, P11, P12, ST)

213-J. (Dutch.) **Exothermic Gas Generators.** C. H. Luiten. *Smit Mededelingen*, v. 11, no. 2, June 1956, p. 61-67.

Principles of operation with particular attention to ways of safeguarding against back-firing and interruption of combustion. Chemical composition of the prepared atmosphere. (J2)

214-J. (Russian.) **New Method of Heat Treating Forgings.** D. I. Kostenko. *Avtomobil'naia i Traktornaia Promyshlennost'*, 1956, no. 5, May 1956, p. 38-40.

The use of cemented steels and other high-quality steels with high-temperature threshold of grain growth, lowered resistance of austenite and other beneficial physical-mechanical properties makes it possible to use isothermal cooling in mechanized containers, after gear forming, thus eliminating normalizing and high-tempering steps. (J26, AY)

215-J. (Russian.) **A Method of Testing the Flowability of Molten Media During Heat Treatment of Steel in Molten Salts and Alkalies.** A. I. Zot'ev and Iu. A. Zot'ev. *Zadvodskaia Laboratoriia*, v. 22, no. 6, June 1956, p. 695-697.

A device for direct measurement of viscosity in a working salt bath. Effect of flowability of the medium on cyanide and case hardening of metals. (J28, S18, ST)

216-J. "Quick Quench" Steel Balls for Ore Grinding. G. Mounsey. *Canadian Metals*, v. 19, July 1956, p. 36-37.

Electric-arc furnace at the mine site provides a continuous supply of long-wearing steel grinding balls. (J26, B13, ST)

217-J. Metallurgical Aspects in the Design and Operation of a New Continuous Annealing Line. A. F. Mohri. *Iron and Steel Engineer*, v. 33, July 1956, p. 148-154.

Time and temperature relationships, effective annealing factors and their influence on hardness of steel. (J23, ST)

218-J. Effect of Conditions of Cooling After Heating Upon Mechanical Properties of Low Alloy Steels. I. A. Nenaezdnikov. *Henry Brutcher, Translation No.* 3758, 4 p. (From *Vestnik Machinostroeniya*, v. 24, no. 8, 1954, p. 52.)

Hardnesses, tensile properties and impact values for two different steels with five different heat treatments. (J general, Q29, Q23, Q6, AY)

219-J. Bit Design, Selection, and Evaluation. II. What Heat Treatment Does for Rock Bits. H. G. Bentson. *Oil and Gas Journal*, v. 54, Aug. 6, 1956, p. 112.

Presents carburizing and quenching procedures. (J28, ST)

220-J. (Russian.) **Change of Carbide Dispersion During Annealing of Quenched Steel.** K. F. Starodubov and S. G. Cherniavskaia. *Dopovidi Akademii Nauk Ukrains' koi RSR*, 1956, no. 3, p. 259-262.

Absence of carbide growth in the

temperature range from 300 to 400° C. and an intensive growth at 425 to 525° C. were observed by means of photocolorimetry. (J23, M26, ST)

221-J. Austempering. *Edgar Allen News,* v. 35, July 1956, p. 137-138.
Procedures, advantages and limitations. (J26)

222-J. Stress Relief Test for Titanium. Harold Bernstein and Eugene A. Gough. *Steel,* v. 139, Aug. 6, 1956, p. 110.
Test is a simple beam loading of a sample. By measuring deflection, initial and permanent set, you can determine amount of stress relief. (J1, Ti)

223-J. Another Look at Nitriding. Howard E. Boyer. *Steel,* v. 139, Aug. 20, 1956, p. 134-136, 138, 140.
The latest techniques in ammonia gas nitriding, proper testing methods and the most recently discovered properties of nitrided steel parts. (J28, ST)

224-J. Ultrasonic Quenching: It's New, More Effective. T. J. Bulat. *Iron Age,* v. 178, Aug. 30, 1956, p. 83-85.
Ultrasonic quenching provides increased hardness. No amount of quench-oil agitation can produce the same quenching effectiveness. (J26)

225-J. Quenching as a Heat Transfer Problem. V. Paschkis and G. Stolz, Jr. *Journal of Metals,* v. 8, sec. 1, Aug. 1956, p. 1074-1075.
Summarizes experimental results. (J26)

226-J. Further Work on the Boron-Hardenability Mechanism. C. R. Simcoe, A. R. Elsea and G. K. Manning. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, sec. 2, Aug. 1956, p. 984-988.
It was found that a critical boron content exists which yields the maximum boron-hardenability effect in hypo-eutectoid steels; hardenability of boron steels with boron contents between 0.00005 and 0.0017% was dependent on the boron content, austenitizing temperature, quenching temperature and austenite grain size. (J26, ST)

227-J. Effect of Prolonged Heating at High Temperature on the Hardenability of Boron-Treated Steels. R. M. Goldhoff, R. Speiser and J. W. Spretnak. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, sec. 1, Aug. 1956, p. 1091.
(J26, ST)

228-J. Isothermal Heat Treating. V. H. Erickson. *Metal Treating,* v. 7, July-Aug. 1956, p. 2-4.
Isothermal annealing, austempering, martempering and modified martempering. (J23, J26)

229-J. The Metallographic View. XXV. Surface Decarburization—Partial and Total. H. E. Boyer. *Steel Processing,* v. 42, Aug. 1956, p. 462-463.
In many metallurgical operations the decarburization of a surface is described by two depth of attack values: maximum effected depth, which is the total depth of any detectable decarburization, and a smaller depth value which reports the extent of total decarburization of the structure. (J28, ST)

230-J. (French.) **Some Metallurgical Aspects of the Quenching of Light Alloy Extruded Products.** M. Renouard and J. Navarro. *Revue de Métallurgie,* v. 53 no. 7, July 1956, p. 522-528.
Presents different ways of heating to obtain sufficient homogenization. Best conditions for a particular texture. (J26, EG-a)

231-J. (Russian.) **Decarburizing Annealing of Cast Iron Sheets.** E. G. Shumovskii. *Metallovedenie i Obrabotka Metallov,* 1956, no. 7, July 1956, p. 10-15.
Annealing sheet cast iron 0.8 to 1.0-mm. thick. Theoretical considerations. Need to reduce the original 3.2% to 3.5% carbon content to 0.08% to 0.05%. Tests and commercial methods of processing. (J28, J23, CI)

232-J. (Czech.) **Stress Relief by Flame Heating.** H. G. Kunz. *Zvaranie,* v. 5, no. 3, Mar. 1956, p. 73-79.
Principles, apparatus and applications. (J1, J2)

233-J. (Russian.) **Nitriding Titanium in Ammonia.** A. N. Minkevich, A. D. Taimer and Iu. A. Zotev. *Metallovedenie i Obrabotka Metallov,* no. 7, July 1956, p. 39-48.
Materials and methods; effects of various processing factors. Nitriding increases abrasion resistance and reduces toughness. Nitriding should be at temperatures below 800 to 900° C.; very little ammonia is needed. (J28, Q9, Ti)

234-J. (Italian.) **Physics for Founders.** Piero Lugiato. *Fonderia,* v. 5, no. 5, May 1956, p. 241-248.
A study of electric furnaces. Advantages of electric heating in metallurgy. Description of various types of electric furnaces, such as electric stoves with forced draft ventilation, arc furnaces and the like. (To be continued.) (J2)

235-J. Heat Treating Retaining Rings for Jet Engines. Arthur G. Portz. *Steel Processing,* v. 42, Aug. 1956, p. 467-469.

Normalizing, hardening and tempering of rings rolled from bar stock. (J26, J24)

236-J. Hardenability Factors for Hypereutectoid Low-Alloy Steels. E. J. Whittenberger, R. R. Burt and D. J. Carney. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, sec. 2, Aug. 1956, p. 1008-1016.

Hardenability (multiplying) factors for carbon, manganese, silicon, chromium, nickel and molybdenum were developed for hypereutectoid low-alloy steels in which bainite is the first subcritical transformation product. These factors permit the calculation of 95, 80 and 50% martensite hardenability from chemical composition when steels with spheroidized structures are quenched from 1475, 1525 and 1575° F. (J26, N8, AY)

237-J. Dual Frequencies Put New Life in Heat Treating Line. *Iron Age,* v. 178, Sept. 6, 1956, p. 96-98.

Using 180 c.p.s. coils to preheat, 9600 c.p.s. coils to harden, this firm jacked up hourly production 50% without increasing layout size. (J2, J26, ST)

238-J. Temperability of Steels. L. D. Jaffe and Edward Gordon. *American Society for Metals, Transactions,* v. 49, *Preprint No.* 14, 1956, 14 p.

A method was derived for calculating, from the composition of a steel, the temperature required to temper it to a desired hardness after quenching to martensite. (J29, ST)

239-J. (Polish.) **The Heat Interchange Coefficient During Cooling in the Hardening Process.** Wl. Loskiewicz and St. Gorczyca. *Hutnik,* v. 23, no. 7-8, July-Aug. 1956, p. 276-282.

A mathematical approach to an understanding of the cooling process in various cooling atmospheres. Influence of various factors on the coefficient of heat exchange. Determining the actual coefficient of heat exchange for oils, kerosene and salt solutions. (J2)

240-J. (Russian.) **Effect of Surface Hardening by Heating With Industrial-Frequency Currents on the Properties of the Working Rolls for Cold Rolling.** V. N. Novikov. *Metallovedenie i Obrabotka Metallov,* no. 6, June 1956, p. 36-47.

As contrasted with high-frequency induction heating, regular currents give a deeper case without overheating and better microstructural results. Change in content of residual austenite in hardened steel in relation to tempering temperature. Service life of case-hardened rolls. (J2, M27, CI)

241-J. (Russian.) **High-Temperature Gas Carburizing of Steels.** G. M. Shuval, I. S. Lupakov and I. A. Fel'dman. *Metallovedenie i Obrabotka Metallov,* no. 6, June 1956, p. 48-52.

Relation of carburizing rate and carbon-concentration curve to temperature. Relation of depth of cementation to period of soak at various temperatures. Effect of high-temperature carburizing on austenite grain growth and core microstructure. (J28, N8, ST)

242-J. Metallurgical Aspects in the Design and Operation of a New Continuous Annealing Line. A. F. Mohri. *Blast Furnace and Steel Plant,* v. 44, Sept. 1956, p. 1043-1047.

Apparatus and procedures. Influence of heating time, soaking time and maximum temperature on hardness. (To be continued.) (J23, Q29, CN)

243-J. Effect of Oxygen Input Rates in the Decarburization of Chromium Steel. G. W. Healey and D. C. Hilty. *Blast Furnace and Steel Plant,* v. 44, Sept. 1956, p. 1048-1051.

In general, higher oxygen input rates result in shorter oxidation periods, lower oxygen consumption, less oxidation of chromium and other metallic values and higher bath temperatures. (J28, AY)

244-J. Quenching Oils in Practice. Michael S. Johns. *Machinery Lloyd (Overseas Ed.),* v. 28, Aug. 18, 1956, p. 86-90.

Of possible quenching media, water and oil are considered best. Discusses heat transfer in liquids. (J2, J26, Pb, ST)

245-J. H. F. Hardening Speeds Mower Export. T. E. W. Preston. *Metalworking Production,* v. 100, Aug. 24, 1956, p. 1327-1332.

An outline of small blade rotor production. Twin-head induction-hardening machine provides speed, accuracy and high degree of flexibility. (J2)

246-J. Birlec Three-Track Continuous Furnace. *Metalworking Production,* v. 100, Aug. 24, 1956, p. 1350-1352.

Capacity, operating cycle and metallurgical control of continuous gas-carburizing furnace for case-hardening gears. (J28)

247-J. Annealing of Steel in Electrode-Heated Salt Baths. A. I. Zot'ev.

Henry Brutcher Translation No. 3122, 9 p. (From *Vestnik Mashinostroeniya,* v. 33, no. 5, 1953, p. 43-46.) Henry Brutcher, Altadena, Calif.

Advantages of internally heated "electrode salt baths" over externally heated salt baths for the heat treating of steel, including high carbon grades. (J2, J23, ST)

248-J. Gas Carburizing With High-Frequency Heating. A. M. Tarasov and B. A. Stetsenko. *Henry Brutcher Translation No.* 3786, 4 p. (From *Vestnik Mashinostroeniya,* v. 34, no. 7, 1954, p. 50-52.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 261-J, 1954. (J28, J2, M27, ST)

249-J. Influence of Alloying Elements on the Case Hardenability of Carburizing Steels. H. U. Meyer. *Henry Brutcher Translation No.* 3787, 24 p. (From *Stahl und Eisen,* v. 76, no. 2, 1956, p. 68-78.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 92-J, 1956. (J28, AY)

250-J. (French.) **Two New Processes of Case Hardening and Prestraining of Steel by Carbonitriding.** J. Pomey, F. Goutel, A. Veragen and R. Le-Roux. *Henry Brutcher Translation No.* 2829, 4 p. (From *Comptes Rendus (Paris),* v. 231, 1950, p. 148-150.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 252-J, 1950. (J28, ST)

251-J. (German.) **Examination With an Electron Emission Microscope of Gas Carburizing of Molybdenum.** *Helvetica Physica Acta,* v. 29, no. 3, June 1956, p. 231-232.

Apparatus and method used in carburizing at 1750° K. Diffusion of carbon in specimens. (J28, N1, Mo)

252-J. (German.) **Investigation of Surface Hardening of Titanium by Means of Nitrogen and Carbon.** Karl Bungardt and Klaus Rüdinger. *Zeitschrift für Metallkunde,* v. 47, no. 8, Aug. 1956, p. 577-583.

Carburization is to be preferred to ammonia treatment because hydrogen embrittlement occurs with treatment in ammonia. (J28, Q29, Q23, Ti)

253-J. How to Understand Surface Hardening. Wayne L. Besselman. *American Machinist,* v. 100, Sept. 24, 1956, p. 136-140.

Review of carburizing, nitriding, carbonitriding, cyaniding, and induction hardening. New furnaces. (J28, J2, ST)

254-J. Alloy Wire Fabrication Requires Wide Variety of Annealing Equipment. R. W. Warner. *Industrial Heating,* v. 23, Sept. 1956, p. 1796 + 8 pages.

Various types of continuous annealing and batch-type furnaces described and illustrated. (J23, F28, Ni, SS)

255-J. (German.) **Experience and Directions for the Surface-Hardening of Cast Materials.** Gerhard Seulen and Oskar Fischer. *Giesserei,* v. 43, no. 18, Aug. 30, 1956, p. 558-565.

Methods of surface hardening, induction hardening and flame hardening of cast steel, cast iron and malleable cast iron. (J28, J2, CI)

256-J. (Polish.) **The Homogenization of Structural Alloy Steels.** Waclaw Luty and Antoni Piotrowski. *Archiwum Hutnictwa,* v. 1, no. 3, 1956, p. 217-249 + 2 plates.

Results of investigations of so-called "interoperation" homogenization of forged chromium-nickel-molybdenum structural alloy steel. (J21, AY)

257-J. The Relative Importance of Material Selection to the Metal Treater. James Sorenson. *Metal Treating,* v. 7, Sept.-Oct., 1956, p. 2-5, 21.

By cooperation between the heat treater and the producer of metal, such difficulties as excessive distortion, improper case or case hardness, or excessive or too shallow case depth may be avoided, and better quality will result. (J28)

258-J. The Heat Treatment of Forgings. A. O. Schaefer. *Metal Treating,* v. 7, Sept.-Oct. 1956, p. 6 + 6 pages.

Discusses flakes and other flaws, quenching and treatment of "critical sections" and heat treatment for stability in further operations. (J general, ST)

259-J. The Heat-Treatment of Steel. C. A. Siebert. *Metal Treating,* v. 7, Sept.-Oct. 1956, p. 14, 16, 42.

An explanation of treatments involved in arriving at a given endpoint. (J general, N8, M26, ST)

260-J. Continuous Gas-Carburising of Steel Components. T. W. Ruffle. *Metal Treatment and Drop Forging,* v. 23, Sept. 1956, p. 339-342.

Layout and operating data of furnace installation. (J28, ST)

261-J. You Can Quench-Age Malleable Iron. C. A. Beiser and E. B. Evans. *Modern Castings,* v. 30, Oct. 1956, p. 39.

Study was made of the hardness

properties of a ferritic malleable iron after various treatments. (J26, Q29, Q23, CI)

262-J. Decarburization—How and Why. Nicholas J. Grant. *Modern Castings,* v. 30, Oct. 1956, p. 64-71.

Photomicrographs of several tests showed that rapid cooling produced quality sections. (J28, M27, Cr, Mn, Mo, ST)

263-J. (Czech.) **Advantages and Disadvantages of Relieving Internal Stresses by Flame Heating, With a Consideration of the Effects of the Welding Materials.** Hans. Pohl. *Zvaranie,* v. 5, no. 7, July 1956, p. 194-197.

Internal stresses which may be created by welding, mechanism of stress formation and relief. Use of refrigerated chambers for tests at low temperatures. (J1, Q25)

264-J. Gas Carburising by the "Homocarb" Process. D. A. Colwell. *Australasian Engineer,* v. 48, Aug. 1956, p. 60-63.

Construction and use of furnace for carburizing mass-produced parts. Fixtures, carburizing media, general considerations. (J28)

265-J. Metallurgical Aspects in the Design and Operation of a New Continuous Annealing Line. II. A. F. Mohri. *Blast Furnace and Steel Plant,* v. 44, Oct. 1956, p. 1175-1178.

Heat treating experiments carried out to determine maximum quenching temperature for low-carbon steels. (J23, J26, CN)

266-J. Recent Developments in Vacuum Heat Treating Furnaces. Roger R. Giler. *Industrial Heating,* v. 23, Oct. 1956, p. 2038 + 7 pages.

Early problems in refining titanium, resultant design and accomplishments of inert-atmosphere electric furnaces. (J23, C25, Ti)

267-J. Practical Aspects and Methods of Carbon Control in Heat Treatment. Wilson T. Groves. *Industrial Heating,* v. 23, Oct. 1956, p. 2060 + 10 pages.

Effect of surface carbon concentration on wear and fatigue life; control of concentration. (J28, Q9, Q7, AY)

268-J. Modify 12 Pct Cr Steels for Better Properties. Paul Shahinian and J. R. Lane. *Iron Age,* v. 178, Oct. 25, 1956, p. 108-112.

A single forged heat was subjected to variations in austenitizing temperature, cooling rate and tempering, giving data useful in developing metallurgically superior grades (J22, J26, J29, Q general, SS)

269-J. Typical Heat Treatments for Wrought Aluminum Alloys. *Materials & Methods,* v. 44, Oct. 1956, p. 139.

Table includes annealing, solution heat and precipitation heat treatment data. (J general, Al)

270-J. Selection of Heat Treating Process and Equipment. E. J. Pavesic and R. T. Sinnott. *Metal Progress,* v. 70, Oct. 1956, p. 83-85.

Some factors to be considered in deciding between batch and continuous heat treating equipment. (J general)

271-J. Annealing of Cold-Worked Copper by Electron Irradiation. C. J. Meechan. *North American Aviation, Inc. (U. S. Atomic Energy Commission),* NAA-SR-1654, Sept. 1956, 15 p.

Wires were cold worked at room temperature to 15% reduction in area and irradiated at various temperatures. Residual resistivity decreased with exposure at temperatures above 100° C. (J23, M26, Cu)

272-J. Nitriding for Case Hardening. Howard E. Boyer. *Steel Processing,* v. 42, Oct. 1956, p. 573, 589.

Combination of nascent nitrogen with the alloys which are in solid solution and precipitation of these alloy nitrides which are then insoluble in the matrix comprises the two nitriding steps. (J28, N7, AY)

273-J. Mass Marquenching. Speeds Carburizing of Truck Transmission Parts. *Steel Processing,* v. 42, Oct. 1956, p. 585-588.

Hardening is from "inside-out" and for this reason is an ideal treatment for such heavily loaded parts as truck gears. Modernization of furnace line is discussed in addition to high-alloy trays and furnace parts and their importance to this new method. (J26, J28)

274-J. Some Thoughts on Spring Heat Treatment and Finishing. E. Mitchell. *Wild-Barfield Heat Treatment Journal,* v. 5, Sept. 1956, p. 2-7.

Aspects of hardening, tempering and austempering small carbon steel springs, including effects of good and bad treatment. (J general, CN)

275-J. (French.) **Surface Hardening by High-Frequency Induction and Application in European Industry.** M. Labrousse. *Métallurgie et la Construction Mecanique,* v. 88, no. 9, Sept. 1956, p. 725-726, 729-731.

Technique, surface structure changes, use on a production line basis, comparison of contour hardening in the U.S.A. and France. (J2)

276-J. (Russian.) **X-Ray Study of the Mechanism of Thermal Action on Plastically Deformed Metals.** Iu. S. Terminasov and G. A. Feklistov. *Izvestiia, Akademii Nauk SSSR, Seriia Fizicheskaia,* v. 20, no. 6, June 1956, p. 695-699.

Manner in which distortions of the crystal lattice are removed by heat treatment, and minimum annealing times and temperatures for certain metals. (J23, M26, ST, Cu, Al)

277-J. Low Cost, Mechanized Selective Heat Treatment. K. M. Yeager. *Canadian Metals,* v. 19, Oct. 1956, p. 48, 50, 52.

Yoke-type axle shafts were heat treated to selectively harden 3 in. of the yoke end. (J26, CN)

278-J. Continuous Annealing of Steel Plate Strip. Horace Drever. *Iron and Steel Engineer,* v. 33, Oct. 1956, p. 109-111.

Chief advantage is uniformity of product. Line speeds are still slow but are increasing. A major problem is cooling. (J23, ST)

279-J. Electromatic Oil Tempered Wire. George A. Sweitzer. *Wire and Wire Products,* v. 31, Oct. 1956, p. 1155-1159, 1278-1279.

With Trauwood unit there is an electrical resistance heating cycle and an arrested quenching cycle for producing oil tempered wire for steel springs. Process produces a finer grained, tougher microstructure with high physical properties. (J general, T7, CN)

280-J. (German.) **New Method of Calculation for Heat Field Detection During Induction Heating of Metals.** H. Lachner. *Metall,* v. 10, no. 19-20, Oct. 1956, p. 930-932.

New method, based on theoretical and experimental work, presented in curves and formulas. (J2, S16)

281-J. (Russian.) **On the Application of Various Types of End-Quench Hardenability Tests.** A. A. Gol'denberg. *Zavodskaia Laboratoriia,* v. 22, no. 9, Sept. 1956, p. 1063-1065.

The standard end-quench test is found most suitable for shallow and medium hardening steels. (J26, ST)

282-J. New Heat Treatments Improve Beryllium Copper. J. T. Richards. *Iron Age,* v. 178, Nov. 8, 1956, p. 95-98.

Advantages include improved strength, better conductivity, resistance to fatigue and an over-all superior material.
(J general, Be, Cu)

283-J. Heat Treatment and Mechanical Properties of Ti-Mo Alloys. F. C. Holden, H. R. Ogden and R. I. Jaffee. *Journal of Metals, v.* 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Sec. 2, Oct. 1956, p. 1388-1393.

Extensive α-β annealing treatments are required to reach equilibrium at lower annealing temperatures. Soft, ductile β phase can be formed on quenching. The formation of strain-induced martensite in retained β over the composition range of 8 to 16% molybdenum results in low yield-to-ultimate strength ratios, high uniform elongation, and high resistance to impact. (J23, J26, Q general, Ti, Mo)

284-J. (Russian.) **Electron Microscope Investigation of an Al-Cu Alloy After High-Temperature Aging and Annealing.** N. N. Buinov and O. D. Shashkov. *Fizika Metallov i Metallovedenie,* v. 3, no. 1, 1956, p. 83-86.

A study of the mechanism of transformation of metastable phases into a stable phase in aluminum-copper alloys. A connection is established between the orientations of the lattices of the phases.
(J23, N9, Al, Cu)

285-J. (Russian.) **Thermal Parameters in Induction Heating of Pressure-Treated Metals.** M. G. Kogan. *Metallovedenie i Obrabotka Metallov,* no. 9, Sept. 1956, p. 49-56.

An analytical treatment of the problem of calculating proper thermal parameters of induction heating from the given initial technological parameters of the treated metal. Appropriate formulas derived. (J2)

286-J. (Russian.) **Practical Experience With Vacuum Annealing of Hot Rolled Transformer Steel.** N. F. Dubrov. *Stal',* v. 16, no. 9, Sept. 1956, p. 811-815.

Advantages of annealing transformer steel in vacuum over that in tunnel kilns. Vacuum annealing results in better magnetic and plastic properties and an improved surface. (J23, P16, Q23, AY)

287-J. (Russian.) **Nitriding of Structural Steels.** E. M. Morozova and A. P. Skuzovatova. *Stanki i Instrument,* v. 27, no. 9, Sept. 1956, p. 25-27.

Experimental nitriding of steels alloyed with chromium, chromium and silicon, and chromium and zirconium. Nitriding increases surface hardness and wear resistance.
(J28, Q29, Q9, AY)

288-J. (Book.) **Induction Heating Practice.** D. Warburton-Brown. 192 p. 1956. Philosophical Library, Inc., 15 E. 40th St., New York 16, N. Y. $10.00.

A practical handbook on the application of the high-frequency induction heating process to brazing, soldering, hardening, annealing, tempering and other heating requirements in engineering. (J2, K7, K8)

SECTION K

JOINING

1-K. Welding Copper and Its Alloys. R. A. Cresswell. *Metal Industry,* v. 87, Oct. 7, 1955, p. 299-302, 308.

Effects of physical and mechanical properties on joints. Micrograph, tables, graph, photographs. 9 ref. (To be continued.) (K general, P general, Q general, Cu)

2-K. Welding Aluminium Alloys. J. F. Lancaster. *Metal Industry,* v. 87, Oct. 21, 1955, p. 339-342; Oct. 28, 1955, p. 369-370.

Considers physical problems of heat flow, weld pool, oxide films, porosity. Discusses heat treatable and non heat treatable alloys. Radiographs, photograph, graphs, tables. 7 ref. (To be continued.) (K general, Al)

3-K. Projection Welding Aluminium. *Metalworking Production,* v. 99, Oct. 28, 1955, p. 1827-1829.

Techniques for resistance projection welding aluminum alloys on a production basis. Photographs. (K3, Al)

4-K. Arc Welding Power Sources. John H. Blankenbuehler. *Welding Engineer,* v. 40, Nov. 1955, p. 23-26.

Three welding types compared to determine best. Flow-sheet, tables. (K1)

5-K. Improvements in Design Performance. A. J. Rosenberg and B. Townshend. *Welding Engineer,* v. 40, Nov. 1955, p. 35-36, 38.

Attempts to evolve mechanical design standards for automatic submerged-arc welding which take into account the beneficial effects of penetration. Diagrams, graphs. (K1)

6-K. An Application of Pressure Welding to Fabricate Continuous Welded Rail. David C. Hastings. *Welding Journal,* v. 34, Nov. 1955, p. 1065-1069.

Railroads use method for smoother riding tracks and decreased maintenance. Photographs. (K2)

7-K. Lower Part Cost by Projection Welding. C. H. Burgston. *Welding Journal,* v. 34, Nov. 1955, p. 1070-1080.

Cost savings and increased production result when certain types of farm implement parts, formerly fabricated by arc welding, are redesigned to be fabricated by resistance projection welding. Photographs, diagrams, table. (K3, ST)

8-K. Seam Welding Dissimilar Thicknesses of Low-Carbon Steel. M. L. Begeman and E. J. Funk. *Welding Journal,* v. 34, Nov. 1955, p. 529S-534S.

Proper conditions for fabrication of pressure-tight joints in sheets determined through laboratory investigation. Tables, graphs, micrographs. (K3, CN)

9-K. Lithium Additions to Brazing Alloys. N. Bredzs and D. Canonico. *Welding Journal,* v. 34, Nov. 1955, p. 535S-543S.

Investigation indicates that lithium is a most suitable metal for developing self-fluxing alloys. Tables, graphs, diagram, micrographs. 8 ref. (K8, Li)

10-K. Investigation of Weld-Metal Cracking in High-Strength Steel. R. P. Sopher, A. J. Jacobs and P. J. Rieppel. *Welding Journal,* v. 34, Nov. 1955, p. 544S-552S.

Hot-cracking resistance studies show that increasing carbon, sulfur and phosphorus contents cause adverse effects. Table, photograph, diagrams, graphs, micrographs. 4 ref. (K9, ST)

11-K. Temper Brittleness of 1Cr-1/2Mo Weld Metal. W. J. Lester and G. R. Prescott. *Welding Journal,* v. 34, Nov. 1955, p. 553S-557S.

Investigation of weld failures in one of the first catalytic-cracking reactors; properties of the welds with several types of electrodes.

Tables, micrographs, diagram. 3 ref. (K9, Q23, AY)

12-K. Fusion Welding of 24S-T3 Aluminum Alloy. J. B. Arthur. *Welding Journal,* v. 34, Nov. 1955, p. 558S-569S.

Report of extensive research program and data on determination of procedures required for successful production welding. Tables, micrographs, diagram, graph, photographs. (K general, Al)

13-K. (English.) **The Place of Metal Bonding in Modern Aircraft Structures.** E. Van Beek. *Technique et science aéronautiques,* 1955, no. 4, p. 257-260.

Judicious use of glued or glue reinforced joints considered. Photographs. (K12)

14-K. (Russian.) **Influence of Nitrogen on the Metal During Argon-Arc Welding of a Stainless Steel Seam.** A. V. Petrov. *Svarochnoe proizvodstvo,* 1955, no. 10, Oct., p. 7-10.

Welding of 1Kh18N9T steels, when nitrogen is present in argon, results in a nitrogen saturation of the metal at the seam, with the formation of stable titanium nitrides; eliminates the stabilization properties of titanium as a carbide forming element; attributes to the formation of hot cracks. Tables, graphs, micrographs. 9 ref. (K1, SS)

15-K. (Russian.) **Zone of Fusion of Austenitic and Pearlitic Steels.** L. S. Livshits. *Svarochnoe proizvodstvo,* 1955, no. 10, Oct., p. 14-16.

Investigates heterogeneity of seam structure during welding and influence of electrode composition and post-welding heat treatment. Table, graph, micrographs, photograph. (K1, AY)

16-K. A New Test Specimen for Side Fillet Welds. A. M. Mackie. *British Welding Journal,* v. 2, Nov. 1955, p. 501-503.

A test specimen for side fillet welds which provides essential data for stress analysis of joints. The test machine is described, and test results given. Graphs, photographs, table. (K9, Q25)

17-K. Double-Fillet Test for Research Into Hot Cracking of Weld Metal. K. Winterton and E. G. P. Hinds. *British Welding Journal,* v. 2, Nov. 1955, p. 513-525.

Outlines double fillet test, including necessary precautions to be taken in performing the test. Photographs, diagrams, graphs, tables. 9 ref. (K9)

18-K. Fastenings That Hold the Future. *INCO,* v. 26, no. 6, Oct. 1955, p. 27-31.

Nontechnical discussion of high-temperature, corrosion resistant fastenings. Photographs. (K13)

19-K. Welding Copper and Its Alloys. R. A. Cresswell. *Metal Industry,* v. 87, Oct. 14, 1955, p. 323-325.

Satisfactory results are realized since the newer, cleaner and faster inert-gas shielded-arc welding processes allow welding without the use of fluxes. Micrographs, photograph. (K1, Cu)

20-K. A Preliminary Report on the Brazing of Titanium to Titanium, and Mild and Stainless Steels. W. J. Lewis, P. S. Rieppel and C. P. Voldrich. *Sheet Metal Industries,* v. 32, no. 343, Nov. 1955, p. 833-848.

Evaluates various commercial brazing alloys, brazing equipment, procedures used; metallographic studies of brazed joints; results obtained in brazing tests. Diagram, photographs, tables. (K8, M general, Ti)

21-K. Welding and Metal Fabrication on the Handley Page Herald. P. H. F. Burton and N. K. Gardner. *Welding and Metal Fabrication,* v. 23, Nov. 1955, p. 410-416.

Construction methods, with particular emphasis on numerous spot welds used. Mechanical properties and test results on alloys used. Photographs, diagrams. 2 ref. (K3, Q general, EG-a)

22-K. Reasons for the Hot Cracking of Welds. V. V. Podgaetskii. *Henry Brutcher Translation No.* 3536, 7 p. (From *Avtomaticheskaya svarka,* v. 7, no. 6, 1954, p. 73-76.) Henry Brutcher, Altadena, Calif.

Correlates hot cracking in weld metal and contents of carbon, sulfur and manganese of the metal with low and high-silica fluxes; effects of carbon. (K9, ST)

23-K. Formation of Hot Cracks in Butt Welds With Extension Tabs. S. L. Mandel'berg and O. S. Zabarilo. *Henry Brutcher Translation No.* 3550, 8 p. (Abridged from *Avtomaticheskaya svarka,* v. 7, no. 6, 1954, p. 29-32.) Henry Brutcher, Altadena, Calif.

Causes of hot cracking in butt welds; use of slits between tabs and main plate and their role in connection with hot cracking of butt welds. Tables, diagrams, photographs. (K9)

24-K. Manufacture and Properties of Metal-to-Metal Laminates. J. J. Saunders and H. R. Merriman. *Aero Digest,* v. 71, Nov. 1955, p. 52-54.

Process of bonding several large sheets of aluminum to form various thicknesses. Photograph, graphs. (K12, Al)

25-K. A Rational Approach to Welding Titanium. K. L. C. Legg. *Aircraft Engineering,* v. 27, Nov. 1955, p. 374-375.

Argon-arc butt welding of thin commercially pure titanium sheet without filler rod. Tables, graph. 2 ref. (K1, Ti)

26-K. Brazing Nichrome V With GE-81 Alloy. H. A. Saller, J. T. Stacy and H. L. Klebanow. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* BMI-947, Aug. 1954, 18 p.

Tensile strengths, ductilities, effects of annealing. Diagram, photographs, graphs. (K8, Q23, J23, Ni)

27-K. Self-Adjusting Welding Arcs: Drift in Power Source Output and Electrode Feed Rate. J. C. Needham. *British Welding Journal,* v. 2, Nov. 1955, p. 506-513.

Measurement, under typical working conditions, of drift in the output of two commercial types of welding plants and the pre-set electrode feed rate of a commercial unit for self-adjusting arcs. Graphs, diagram. 2 ref. (K1)

28-K. Inert Gas Welding of Aluminum Alloys. I. M. J. Waite. *Canadian Metals,* v. 18, Nov. 1955, p. 62, 64, 66, 68.

Principal aluminum welding processes, with particular reference to the application of these processes in welding aluminum alloys. Photographs. (K general, Al)

29-K. Rapid Welding Techniques Speed Girder Fabrication. Edward Brocke. *Iron Age,* v. 176, Nov. 17, 1955, p. 116-117.

Semi-automatic submerged arc welding is supplemented by manual methods, using iron powder type electrodes. Speed of welding with wire feed averages 13 to 14 in. per min. Photographs. (K1)

30-K. Weld Titanium Sheet Leftovers Into Machinable Billets. C. W. Shipley. *Iron Age,* v. 176, Nov. 24, 1955, p. 90-91.

Pieces of sheet can be stacked and spot welded to produce a small billet suitable for machining. Photographs. (K3, G17, Ti)

31-K. Polymer to Metal Adhesion. The System Polyvinyl Acetate-Steel. S. W. Lasoski, Jr., and Gerard Kraus. *Journal of Polymer Science,* v. 18, Nov. 1955, p. 359-376.

In the limit of small film thickness the effective tensile adhesion of polyvinyl acetate to steel is of the order of the tensile strength of the polymer. Scrupulous cleanliness is essential for successful bonds; a trace of fatty acid nearly halved the bond strength. Tables, graphs. 21 ref. (K11, ST)

32-K. Selecting Electrodes and Welding Rods. II. Stainless Steels. Helmut Thielsch. *Machine Design,* v. 27, Dec. 1955, p. 195-199.

Properties and characteristics of filler metals. Photographs, tables. 2 ref. (K1, SS)

33-K. Brazing Aluminium. R. H. Warring. *Machinery Lloyd (Overseas Ed.),* v. 27, Nov. 19, 1955, p. 73, 75-78.

Includes diagrams, tables. (K8, Al)

34-K. Welding Aluminium Alloys. J. F. Lancaster. *Metal Industry,* v. 87, Nov. 4, 1955, p. 389-390.

Characteristics of various alloys in relation to welding. Graphs. 3 ref. (K general, Al)

35-K. Plastic Bonding for Metals. R. A. Johnson. *Metal Industry,* v. 87, Nov. 25, 1955, p. 443-445.

Bonding of metals by the use of synthetic resin adhesives. Photographs. (K12)

36-K. Some Fundamental Aspects of Rubber-Metal Adhesion. D. M. Alstadt. *Rubber World,* v. 133, Nov. 1955, p. 221-231, 240.

Structure and nature of the rubber, the adhesive polymer and the metal as they relate to adhesion. Diagrams, micrographs. 17 ref. (K11)

37-K. Submerged Automatic Arc Welding of Rusty Steel. A. G. Mazel and B. P. Vasil'kov. *Henry Brutcher Translation No.* 3591, 9 p. (From *Avtomaticheskaya svarka,* v. 7, no. 6, p. 44-51.) Henry Brutcher, Altadena, Calif.

Effects of welding current and arc voltage on porosity, particle size of flux, type of weld, moisture in rust, manganese, silicon and carbon on pore formation, and of rust on weld properties. Micrograph, graphs. 6 ref. (K1, ST)

38-K. Joining and Finishing of Zirconium. I. Arc Welding. D. C. Martin. Paper from "The Metallurgy of Zirconium". National Nuclear Energy Series, Division VII—v. IV. McGraw-Hill Book Co., p. 307-320.

Directions for obtaining welds of good appearance and soundness. Weld properties. Photographs, graphs, micrographs, tables. (K1, Zr)

39-K. Joining and Finishing of Zirconium. II. Resistance Welding. A. H. Kasberg. Paper from "The Metallurgy of Zirconium". National Nuclear

Energy Series, Division VII—v. IV. McGraw-Hill Book Co., p. 320-322.

Review of work that has been done indicates that no serious problems other than contamination are encountered. (K3, Zr)

40-K. Joining and Finishing of Zirconium. III. Solid-Phase Welding. S. J. Paprocki. Paper from "The Metallurgy of Zirconium". National Nuclear Energy Series, Division VII—v. IV. McGraw-Hill Book Co., p. 322-325.

Bonding and cladding methods, including roll cladding, swaging and drawing, and powder metallurgical techniques. Graph. (K5, L22, H general, Zr)

41-K. Joining and Finishing of Zirconium. IV. Brazing. J. R. Keeler. Paper from "The Metallurgy of Zirconium". National Nuclear Energy Series, Division VII—v. IV. McGraw-Hill Book Co., p. 325-326.

Exploratory tests of various fluxes, brazing alloys and techniques. (K8, Zr)

42-K. (German.) **Applicability of Alternating Current for Deep-Penetration Welding.** Herbert Neumann. *Schweissen und Schneiden,* v. 7, no. 10, Oct. 1955, p. 415-423.

Fundamentals of deep-penetration welding; influence of current on weld and of increased voltage and current on penetration and weld shape. Diagrams, tables, graphs, photographs. (K1)

43-K. (German.) **What Is to Be Observed in Gas Welding Cast Iron?** Hans Reininger. *Schweissen und Schneiden,* v. 7, no. 10, Oct. 1955, p. 424-429.

Differences in welding rolled steel and cast iron; correct and homogeneous preheating; welding of gray cast iron. Micrographs, photographs, tables. (K2, CI)

44-K. (Swedish.) **Properties and Application of Penetration Electrodes and High Exchange Electrodes.** Erik Magnusson. *Svetsaren,* v. 20, no. 1, 1955, p. 1-13.

Investigation on increasing the rate of welding in order to decrease working time. Theory of various electrodes and their economic advantages. Tables, graphs, photograph. (K1)

45-K. (Book—German.) **Joining and Fastening Elements for Instruments.** Hermann Pöschl. 108 p. 1954. Springer-Verlag, Berlin, Germany.

Methods for connecting and joining different parts in instruments used for precision work. (K13)

46-K. Welding of Molybdenum Heat Exchangers. Robert E. Monroe and David C. Martin. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* BMI-1019, July 1955, 12 p.

Production of complex welded components in currently available arc-cast molybdenum is feasible. Table, photographs, diagrams. 2 ref. (K1, Mo)

47-K. Problems Associated With the Design and Construction of Wind Tunnels. E. F. Burford. *British Welding Journal,* v. 2, Dec. 1955, p. 541-549.

Welding aspects of the design and construction of a high-speed and a low-speed wind tunnel. The high-speed tunnel, required for use at near to supersonic speeds, is powered by three jet engines. Special factors that had to be considered were the high operating temperatures, the possibility of pronounced vibration, drumming and noise. The low-speed tunnel is of orthodox design and is fan-driven. Diagrams, photographs. (K1)

48-K. Procedures and Joint Preparation for Welded Storage Tanks. Charles Osicka. *Industry & Welding* v. 28, Dec. 1955 p. 46-48, 51, 76.

Fabrication of cement-storage tanks. Photographs, diagrams. (K1, CN)

49-K. Testing Welded Metal Joints. S. W. Hollingum. *Metal Industry,* v. 87, Nov. 11, 1955, p. 401-404.

Preparation of standard test samples, testing by determination of mechanical properties and by observation of microstructure; nondestructive test methods. Diagrams, micrographs. (To be continued.) (K9, Q23, M27, S general)

50-K. Weldability. J. F. Mercer. *Metal Industry,* v. 87, Dec. 2, 1955, p. 471-472.

Factors involved and tests employed to determine weldability of metals in general. 1 ref. (K9)

51-K. Mechanized Welding Goes Ahead in Aero-Engine Production. F. G. C. Sandiford. *Metalworking Production,* v. 99, Dec. 9, 1955, p. 2084-2089.

Machines which were built to meet problems of handling large and accurate assemblies in heat resisting materials used in gas-turbine and similar propulsion units for aircraft. Photographs, diagrams. (K1, K3)

52-K. An Analysis of the Behaviour of Riveted Joints in Aluminium Alloy Ships' Plating. A. R. Flint. *North East Coast Institution of Engineers & Shipbuilders, Transactions,* v. 72, Dec. 1955, p. 83-122.

Elastic behavior, strength and watertightness tested. Tables, graphs, diagrams. 18 ref. (K13, Al)

53-K. (French.) **Longitudinal Induction Welding of Cold Formed Tubes.** A. Fischer. *Soudage et techniques connexes,* v. 9, nos. 9-10, Sept.-Oct. 1955, p. 229-232; disc., p. 233-235.

Automatic welding installation and optimum conditions for operation; advantages of the method. Table, diagrams, photographs. (K6)

54-K. (French.) **Welding of Discharge Pipe Lines in France.** R. Bouchayer. *Soudage et techniques connexes,* v. 9, nos. 9-10, Sept.-Oct. 1955, p. 243-252; disc. p. 252-254.

Selection of method for the particular material; standards for pipeline material. Table, photographs. (K1, S22)

55-K. (German.) **Butt-End Gas Welding of Gray Cast Iron.** Leo Hütter and Heinz Neumann. *Giesserei,* v. 42, no. 22, Oct. 27, 1955, p. 605-609.

Shows the basic possibility of welding when upsetting is done correctly. Relation between the welding factors and durability of welded joint. Diagrams, photographs, micrographs. 9 ref. (K2, CI)

56-K. (German.) **Arc Welding of Copper and Its Alloys in an Inert Gas Atmosphere.** W. Mantel and L. Wolff. *Metall,* v. 9, nos. 21-22, Nov. 1955, p. 942-946.

Current consumption for welding, preheating, properties of items welded in argon. Table, graphs, diagrams, photographs. (K1, Cu)

57-K. Embrittlement of Multipass Welds in Zircaloy 2. John T. Niemann and Raeman P. Sopher. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* BMI-1006, June 1955, 18 p.

Embrittling effect does not appear to be large enough to be serious. Ductility can be improved by postweld heat treatment. Diagrams, photographs, micrographs, tables. (K1, K9, Zr)

58-K. Joint Design for Joining Tubes to Tube Sheets for Corrosive Radioactive Chemical Service. W. R. Smith. *Hanford Atomic Products Operation (U. S. Atomic Energy Commission),* HW-37983, Aug. 1955, p. 4-18.

Joints have been developed which are suitable for cases where either the corrosive solution is in contact with the inside or the outside of the tubes. These joints can be produced economically with minimum skills and can be consistently reproduced with a high degree of integrity and reliability. Diagrams, photographs, tables. (K general)

59-K. Resistance Brazing Replaces Soft Soldering. Dave Ritchie. *Industry & Welding,* v. 28, Dec. 1955, p. 58-60.

Brazing machines and operating procedures for silver brazing electrical components. Photographs. (K8, Ag-d)

60-K. New Epoxy Adhesive. Bernard Gould. *Materials & Methods,* v. 42, Dec. 1955, p. 140, 142.

A one-component thixotropic formulation applicable to production metal bonding. Table, photographs. (K12)

61-K. Mechanized Welding Makes Aero-Engines. I. F. G. C. Sandiford. *Metalworking Production,* v. 99, Dec. 2, 1955, p. 2041-2045.

Methods of fusion and resistance welding. Describes and illustrates machines now in use. Photographs, diagrams. (K1, K3)

62-K. Inert-Gas Metal-Arc Process Applied to the Welding of Stainless Steel. C. Lewis Railton. *Welding and Metal Fabrication,* v. 23, Dec. 1955, p. 455-464.

Porosity, effect of feed speed and current on the arc, butt and fillet welds and welding conditions for mechanical testing of welds. Micrographs, diagrams, tables, photographs. 4 ref. (K1, SS)

63-K. Refrigeration Equipment Assemblies. Application of Special Resistance Welding Plant. N. Maylin. *Welding and Metal Fabrication,* v. 23, Dec. 1955, p. 472-474.

Plant and technique problems encountered in applying resistance welding to production of refrigeration equipment. Special welding equipment described and illustrated. Photographs, diagrams. (K3, ST, Al)

64-K. Distortion in Welding. I. Electric Arc Welding. W. T. Amison. *Welding and Metal Fabrication,* v. 23, Dec. 1955, p. 475-477.

Techniques intended to minimize distortion; summarizes various methods by a series of rules. Diagrams. (To be continued.) (K1, ST)

65-K. (Czech.) **Effect of Flame Smoothing on the Propertes of Steels.** A. Strachota. *Strojirenska vyroba,* v. 3, no. 7, July 1955, p. 293-295.

Effects of flame smoothing of welds and heating during welding of sheet steel. Explanations of recrystallization and structural changes during cooling. Graphs, table. (K2, N5, Q23, ST)

66-K. (Czech.) **Preheating When Welding Steels Under High-Temperature and High-Pressure Conditions.** J.

Vrtel. *Strojirenstvi,* v. 5, no. 7, July 1955, p. 518-525.

Factors affecting crack formation include hardenability, austenitic and bainitic transformations, thermal cycle of welding, stresses from shrinking during cooling, hydrogen content. Graphs, tables, micrographs. 10 ref. (K general, N8, AY)

67-K. (French.) **Autogenous Methods Using Gas. Welding and Brazing. Cutting. Surface Treatment. Heat Treatment.** H. von Hofe and H. Killing. *Revue de la soudure (Brussels),* v. 11, no. 3, 1955, p. 126-136.

Optimum conditions of operation and fields of application. Tables, diagrams, photographs. (K2, K8, G22, J2)

68-K. (French.) **Arc Welding Under Flux of Thick Material.** L. Dubois. *Soudure et techniques connexes,* v. 9, nos. 9-10, Sept.-Oct. 1955, p. 259-268; disc. p. 268-269.

Optimum conditions depending on characteristics of materials. Testing of welded seams. Tables, diagrams, photographs, micrographs. (K1)

69-K. (German.) **Resistance-Welding Electrodes of Beryllium-Copper With Silver Additions.** Theodor Fuchs. *Schweisstechnik,* 9, no. 9, Sept. 1955, p. 106-108.

Physical and chemical properties of electrodes and their practical application. Photographs. (K3, T5, Be, Cu, Ag)

70-K. (Russian.) **Progress in Welding Techniques and Technology.** *Svarochnoe proizvodstvo,* 1955, no. 11, Nov., p. 1-2.

Surveys Russian accomplishments, new methods, suggested lines of advancement and improvements, and indication of certain hindrances and shortages (oxygen, calcium carbide, etc.). (K general)

71-K. (Russian.) **Further Developments of Automatic Welding.** B. E. Paton. *Svarochnoe proizvodstvo,* 1955, no. 11, Nov., p. 3-8.

Operation and applications of the up-to-date Russian welding machines and devices, including mobile welding units for semi-submerged arc welding of thick-sheet aluminum and its alloys. Photographs, diagrams. (K general, K1, Al)

72-K. (Russian.) **Causes for the Formation of Pores During Electric Arc Welding of Silumin.** I. E. Gnedovskii. *Svarochnoe proizvodstvo,* 1955, no. 11, Nov., p. 13-15.

Factors affecting and recommendations for avoiding porosity. Graphs, micrographs, diagram. 1 ref. (K1, Al)

73-K. (Russian.) **Welding at the Bryansk Locomotive Construction Works.** Z. L. Klimovitskii. *Svarochnoe proizvodstvo,* 1955, no. 11, Nov., p. 16-19.

Design and operation of automatic equipment in use, various types of welding employed. Diagrams, table, photographs. (K1, ST)

74-K. (Russian.) **Welding of Steel 1Kh18N9T in Atmosphere of Protective Gases With Formation of Root of Butt Welds Without Back-Up Blocks.** M. D. Tiul'kov. *Svarochnoe proizvodstvo,* 1955, no. 11, Nov., p. 20-22.

Electrical conditions for argon or helium-shielded nonconsumable tungsten electrode welding of straight or curved pieces. Tables, diagrams, photographs. (K1, AY)

75-K. (Slovak.) **Welding in the Vacuum Industry.** Werner Espe. *Zvaranie,* v. 4, no. 7, July 1955, p. 196-207.

Electric-resistance, and cold, arc, and flame welding methods used in the construction of high-vacuum and gas-filled electron tubes. Conditions demand use of great amounts of hydrogen and rare gases and eliminates use of fluxes. Photographs, tables, graph, diagrams. 50 ref. (K general)

76-K. (Slovak.) **Basic Principles of Heat Propagation in the Welded Joint.** Andrej Havalda. *Zvaranie,* v. 4, no. 7, July 1955, p. 215-218.

Characteristics of electric arc as a source of heat; calculation of heat in a certain point of a stationary field. Graphs. 3 ref. (K1)

77-K. Spotwelding in the Handley Page Herald. *Aircraft Production,* v. 18, Jan. 1956, p. 18-27.

Manufacturing techniques developed for attaching components of primary structure. Diagrams, graphs, micrographs, photographs, tables. (K3)

78-K. How to Use Fluxes and Solders for Good Joints. W. P. McQuillan. *American Machinist,* v. 100, Jan. 2, 1956, p. 81-84.

Corrosive and noncorrosive fluxes, solder alloy composition, effects of residual flux, means for removing flux, joint strength versus temperature, other details. Graphs, micrographs, table. (K7)

79-K. Inert Gas Welding of Aluminum Alloys. II. M. J. Waite. *Canadian Metals,* v. 18, Dec. 1955, p. 44, 46-48.

Welding procedures, properties of weldments, quality control, economic considerations, applications in transportation, chemical and electrical industries, also in pressure vessels and machinery. Photographs. (K1, T general, Al)

80-K. High-Temperature Furnace Brazing. D. M. Dovey and K. C. Randle. *Metal Treatment and Drop Forging,* v. 22, Dec. 1955, p. 501-505.

Brazing method without a flux based on use of a controlled atmosphere. Micrographs, photographs, tables. 5 ref. (K8)

81-K. History of the Coated Electrode. John J. Chyle. *Welding Engineer,* v. 41, Jan. 1956, p. 25-27.

Changes that have been made in welding tools during the past 30 years. Photographs. (K1)

82-K. Welding Positioners Set the Stage for Weld Quality and Greater Speeds. Ernest L. Richmond. *Welding Engineer,* v. 41, Jan. 1956, p. 33-36.

Salient points to consider in selection and application of positioning equipment, which may be identified as welding or work positioners, headstocks and tailstocks and turning rolls. Photographs, diagrams. (K1)

83-K. The How and Why of Adhesive Bonding. I. Samuel N. Muchnick. *Welding Engineer,* v. 41, Jan. 1956, p. 42, 44.

Review of conditions for adhesive bonding. Photographs, graph. (To be continued.) (K12, Al, Mg, SS)

84-K. Miles of Piping Are Tig Welded. Morris P. Rosen. *Welding Engineer,* v. 41, Jan. 1956, p. 46, 48.

Phases involved in the country's welding of one of the largest stainless steel piping networks. Photographs. (K1, SS)

85-K. How to Weld High-Pressure Vessels With Automatics. Wilmer W. Weber. *Welding Journal,* v. 34, Dec. 1955, p. 1161-1166.

Experience proves submerged arc automatics reduce costs, improve working conditions, increase production and quality. Recommendations for its application to pressure vessel welding, since it meets all code requirements. Photographs. (K1, ST)

86-K. Electrode Activation for Inert-Gas-Shielded Metal-Arc Welding. A. Lesnewich. *Welding Journal,* v. 34, Dec. 1955, p. 1167-1178.

Use of extremely dilute, invisible coatings of the alkali, alkaline earth and rare earth elements, or certain oxides, to electrodes, stabilizes metal transfer and modifies deposition rate, penetration and size and shape of weld bead. Application of coatings extended to all industrial metals. Photographs, graphs, tables. 17 ref. (K1)

87-K. Manual-Arc Welding of Butt Joints in Crane Rails. Ivan Kutuchief. *Welding Journal,* v. 34, Dec. 1955, p. 1179-1184.

Wear and deformation on rail ends corrected by use of covered metal-arc electrodes. Photographs, table, diagrams. 1 ref. (K1, ST)

88-K. Engineering Aspects of Inert-Gas Tungsten-Arc Welding of Piping. Helmut Thielsch and C. S. Pulliam. *Welding Journal,* v. 34, Dec. 1955, p. 1185-1195.

Effects of joint design and purging, root-pass cracking, limitations of inspection techniques, advantages of consumable welding insert rings. Photographs, diagram, micrographs, tables, graph, X-ray radiograms. 3 ref. (K1)

89-K. Mechanical Properties of Modified Type 347 Weld Metals. *Welding Journal,* v. 34, Dec. 1955, p. 583S-595S.

Evaluates ability of the electrodes to meet standard fabrication codes, determines tensile and notch impact properties before and after exposure to elevated temperatures. Diagrams, tables, micrographs, graphs. 10 ref. (K9, Q6, SS)

90-K. Measurement of Shunting Currents in Series Spot Welding 0.036-in. Steel. E. F. Nippes, W. F. Savage and S. M. Robelotto. *Welding Journal,* v. 34, Dec. 1955, p. 618S-624S.

Effects of spot spacing, electrode and backing bar geometries, material preparation and electrode force on size and distribution of shunt currents. Tables, photograph, diagrams, graphs. 8 ref. (K3, ST)

91-K. Automatic Pressure Butt-Welding Process for High Pressure Pipe Lines. *Engineer,* v. 200, Dec. 23, 1955, p. 913-914.

A gas welding process in which the desired pressure is developed automatically by making use of the plasticity of the steel that is being welded to control the welding cycle. Diagram, micrograph, photographs. (K2, AY)

92-K. The Significance of Contact Angle Measurements in Soldering. N. R. Srinivasan and H. S. Aswath. *Indian Institute of Science, Journal,* v. 37, sec. B, Oct. 1955, p. 293-303.

A critical review of contact angles in soldering, spreading power of a solder over a metallic surface and various fluxes used. Diagram, tables. 44 ref. (K7, SG-f)

93-K. How to Get Better Welds in a Weldable Steel. H. S. Davis. *Iron*

Age, v. 177, Jan 19, 1956, p. 70-71.

Methods of welding Carilloy, low-carbon quenched and tempered constructional alloy plate steel. Tests show that welding does not affect tensile properties, improves hardness and toughness. Photographs. (K1, Q general, AY)

94-K. New Flux Simplifies Brazing of Chrome Carbide. *Iron Age,* v. 176, Dec. 22, 1955, p.82.

Brazing of sintered chromium carbide in air, without special equipment, is now economically practicable with a flux containing powdered boron. Photograph. (K8, Cr)

95-K. New Adhesives for Metal Structures. George J. Baumbach, Jr. *Sperry Engineering Review,* v. 8, Nov.-Dec. 1955, p. 17-21.

Use and bonding properties of new adhesives; their industrial potential in the metal structures field. Diagram, tables. 4 ref. (K12)

96-K. (Czech.) **Introduction to Automatic Welding Under Flux.** J. Lukasek. *Strojirenska vyroba,* v. 3, no. 10, Oct. 1955, p. 395-401.

Comparison of various operational techniques, types of welds possible, descriptions of automatic welding machines used. Photographs, tables, diagrams. (K1)

97-K. (Czech.) **Full Utilization of Welding Technology.** R. Krnak. *Strojirenska vyroba,* v. 3, no. 10, Oct. 1955, p. 401-404.

Situations where welded parts can be used instead of cast parts. Comparative cost figures. Graphs, tables, photographs, diagrams. 4 ref. (K general, CI, ST)

98-K. (Russian.) **Selection of Basic Parameters of Apparatuses for Condenser Butt Welding.** N. S. Siunov and M. A. Sergeev. *Svarochnoe proizvodstvo,* no. 12, Dec. 1955, p. 4-6.

Voltage, current, gap, boiling temperature of metal, and other factors are calculated for welding wires of high heat resistant alloys. Circuit diagram, diagram. 3 ref. (K1, SG-h)

99-K. (Russian.) **Use of Contact Machines, Types MTP and MShP, for Welding Light Alloys.** D. S. Balkovets and P. L. Chuloshnikov. *Svarochnoe proizvadstvo,* no. 12, Dec. 1955, p. 19-21.

Description of functioning of primary winding and volt-supplementing transformer. Capabilities of these machines for spot welding of sheets. Table, diagrams. (K3, EG-a)

100-K. (Russian.) **Adhesion of Metals During Local Plastic Deformation.** S. G. Aibinder and E. F. Klokova. *Zhurnal tekhnicheskoi fiziki,* v. 25, no. 13, Nov. 1955, p. 2356-2364.

Adhesion between two smooth metal surfaces is caused by interatomic forces, but its development is affected by the surface film deformation and mechanical properties of the film and base metal. Tables, micrographs. 10 ref. (K12, Q24)

101-K. (Spanish.) **Argon Arc Welding.** Alfredo Sarria. *Ciencia y técnica de la soldadura,* v. 5, no. 26, Sept.-Oct. 1955, 10p.

Various methods; advantages and disadvantages of each. Tables, photographs, diagram. (K1)

102-K. (Spanish.) **The Development of Some Special Welding Processes.** W. Hofmann. *Ciencia y técnica de la soldadura,* v. 5, no. 26, Sept.-Oct. 1955, 6 p.

Recent results from cold pressure welding on steel, diffusion bonding, welding of pins and flow welding. Diagrams, graphs, photograph, micrographs. (K5, K6, ST)

103-K. (Spanish.) **Joining of Aluminum Cables With Steel Core by an Aluminothermal Process.** R. Mearin Domezain. *Ciencia y técnica de la soldadura,* v. 5, no. 26, Sept.-Oct. 1955, 5 p.

Process of welding aluminum cables by electrical conduction. Diagram, photographs. (K3, Al)

104-K. Progress in the Use of Welded Steel Structures. J. W. Roderick. *Australasian Engineer,* 1955, Nov., p. 48-52.

Progress that has been made in the methods, procedures and overall efficiency of welded steel structures. Diagrams, table, photographs. (To be continued.) (K1, T26, AY)

105-K. An All-Welded Aluminium High-Speed Motor Launch. R. C. Du Cane. *British Welding Journal,* v. 3, Jan. 1956, p. 1-9.

Application of certain welding processes to construction of light-alloy marine craft. Describes experimental work, construction, various problems encountered. Process offers saving in man-hours and opportunity for prefabrication. Diagrams, photographs, table. (K general, Al)

106-K. Resistance Welding and Post-Heat-Treatment of Steel Stud Projection Welds. E. V. Beatson, E. Mitchell and L. N. Sayer. *British Welding Journal,* v. 3, Jan. 1956, p. 10-19.

Technique for temperature measurement of heat affected zone permits quick determination of satisfactory post-heat treatments for me-

dium-carbon steels, thus extending range of weldable steels. Tempering treatment used to improve joint properties of low-carbon steels. Effect of welding and post-heating on transformation characteristics. Diagrams, graphs, micrographs, tables. 4 ref. (K3, K9, N8, J1, ST)

107-K. Welding in the Shipbuilding Industry. R. J. W. Rudkin. *British Welding Journal,* v. 3, Jan. 1956, p. 22-24.

Research on butt-welding processes, fillet welding by visible-arc machines and the brittle fracture problem is urgently needed. Labor scarcity, need for modernization, fatigue failure present further problems. (K1, Q26)

108-K. Projection Welding in the Clutch. Charles Berka. *Industry & Welding,* v. 29, Jan. 1956, p. 50-52, 55.

Projection welding is performed on a press-type combination projection and spot welder. The resulting clutch assembly is clean, free from spatter, has high strength. Photographs. (K3)

109-K. How Circuit Revisions Improve Automatic Arc Welds. W. F. Williams. *Industry & Welding,* v. 29, Jan. 1956, p. 58-60, 63-66.

Operation of an automatic welding machine; circuit changes to improve weld quality. Graphs, diagram. (K1)

110-K. "Inside-Out" Bronze Brazing Makes Strong Structural Joints. *Industry & Welding,* v. 29, Jan. 1956, p. 70-72.

Method utilizes bronze beads for filler metal and applies a brazing alloy from the inside. Multiple-tip torches with flux-bearing flames provide rapid even heat and assure application of the proper amount of flux. Photographs. (K8)

111-K. Ceramic Brazing Jigs Cut Cycle Time, Raise Output. Herbert Schwartz. *Iron Age,* v. 177, Jan. 12, 1956, p. 71-73.

Advantages and disadvantages of brazing as a joining method for various materials. Graph, photograph, table. (K8)

112-K. Good Handling Steps Up Brazing Furnace Output. D. W. Owen. *Iron Age,* v. 177, Jan. 19, 1956, p. 78-79.

Partially automatic system for production of aluminum refrigerator parts. Particular features are close temperature and atmosphere control, automatic welding, safety platforms for loading. Photographs. (K8, A5, A1)

113-K. Argon-Arc Welding Offers Opportunities. T. E. W. Preston. *Metalworking Production,* v. 100, Jan. 6, 1956, p. 1-8.

British practice in use of one-side argon-arc spot welding, a development of the inert-gas shielded tungsten-arc processes. Photographs, diagrams, tables, graphs. (K1, K3)

114-K. Consumable Insert Technique for Pipe Welding. R. D. Thomas Jr. *Pipe Line News,* v. 28, Jan. 1956, p. 28-31.

New method for root-pass welding provides reliable piping for atomic installations without requiring highly skilled operators, internal gas-pressure control or rigid fit-up tolerances. Diagrams, photographs, tables, micrographs. 6 ref. (K1)

115-K. High-Strength Cast Steel With Good Welding Properties. I. R. Kryanin. *Henry Brutcher Translation No.* 3605, 7 p. (From *Svarochnoe proizvodstvo,* 1955, no. 7, p. 7-9.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 361-K, 1955. (K9, M27, J general, Q23, Q29, CI)

116-K. (Dutch.) **The Welding of Very Large High-Pressure Tanks.** C. J. Verzijlbergh. *Smit mededelingen,* v. 10, no. 3a, Dec. 1955, p. 102-105.

Use of closed joint design in the U.M. ("Unionmelt") welding of extraction towers made of 75-mm. plates. Graph, diagram, photographs. (K1, ST)

117-K. (Dutch.) **The U.M. ("Unionmelt") Welding of Thick Plates.** G. Westendorp. *Smit mededelingen,* v. 10, no. 3a, Dec. 1955, p. 115-121.

Concludes that heavily stressed structures, over 50 mm. thick, must be welded by the multipass method. Tables, graphs, diagrams, photographs. (K1, ST)

118-K. (Dutch.) **Welding With Smit-Welding Tape.** P. G. Weeber. *Smit mededelingen,* v. 10, no. 3a, Dec. 1955, p. 122-124.

Advantages and use of Smit-welding tape on open joints. Tables, diagrams, photographs. (K1)

119-K. (Dutch.) **"Sigma" (Shielded Inert-Gas Metal-Arc) Welding of Nonferrous Metals.** P. J. Verlee. *Smit mededelingen,* v. 10, no. 3a, Dec. 1955, p. 132-136.

Argon-arc and "sigma" welding compared in nonferrous metals; future developments considered. Examples of "Sigma" welding. Table, graph, diagrams, photographs. (K1)

120-K. (Dutch.) **Annealing of Weld Seams.** J. J. M. Roos. *Smit mededelingen,* v. 10, no. 4, Oct.-Dec. 1955, p. 146-157.

Examples of indirect resistance and induction heating. Diagrams, photographs. (K3, J23)

121-K. (French.) **Welded Gates of Movable River Dams. Design and Execution.** G. Willems. *Revue de la soudure (Brussels),* v. 11, no. 4, 1955, p. 175-190.

Advantages of welding in the construction of dam gates, making possible light, simple, inexpensive frames little affected by vibrations. Maps, diagrams, photographs. (K general)

122-K. (French.) **Welding in the Construction of Steam Turbines and in the Electrical Equipment of Heating Plants.** Ch. Forcinal. *Soudage et techniques connexes,* v. 9, nos. 11-12, Nov.-Dec. 1955, p. 281-294; disc., p. 294-296.

Different welding processes in the construction of steam turbines, alternators, transformers, high-voltage circuit breakers. Photographs, diagrams. (K general, T25, T1)

123-K. (French.) **Metallurgical Problems During the Electric Arc Welding of Steels for Turbine Wheels.** Stig-Erik Erikson. *Soudage et techniques connexes,* v. 9, nos. 11-12, Nov.-Dec. 1955, p. 297-310.

New method of examining the weldability of turbines, based on heating by high-frequency current. Diagrams, graphs, tables, micrographs. 10 ref. (K1, K9, ST)

124-K. (French.) **Some Applications of Welding to the Maintenance and Repair in Electric Power Plants.** G. M. A. Blanc. *Soudage et techniques connexes,* v. 9, nos. 11-12, Nov.-Dec. 1955, p. 312-318.

Welding of turbines, alternators, Pelton wheels, diesel engines, turbo-alternators. Table, diagrams, micrographs, photographs. (K general, T25)

125-K. (French.) **High-Strength Weldable Steels.** Lachenaud. *Technique et science aéronautiques,* 1955, no. 5, p. 314-320.

Four types of chromium-molybdenum steels, from point of view of metallurgy and blow-torch and arc welding, for use in airframe construction Table, graphs, diagrams. (K1, K2, AY)

126-K. (German.) **Contemporary State of Electrical Resistance Welding. II.** Walter Brunst. *Elektrotechnische Zeitschrift,* v. 7, Ausgabe B, no. 12, Dec. 1955, p. 442-448.

Principles of various types using induction contact electrodes. Table, graphs, diagram, photographs, micrographs. 10 ref. (K3)

127-K. (German.) **Fundamentals of Welding Non-Ferrous Heavy Metals and Their Alloys in Industrial Finishing.** E. Klosse. *Metall,* v. 9, nos. 23-24, Dec. 1955, p. 1086-1087.

Applications to pure copper, nickel, zinc and lead, and their various alloys, in addition to galvanized steel sheet and silver. (K general, Cu, Ni, Zn, ST, Pb, Ag)

128-K. (German.) **Behavior of Welded Joints Between Rolled Steel and Cast Steel Under Pulsating Tensile Stress.** K. Wellinger and P. Gimmel. *Schweissen und Schneiden,* v. 7, no. 12, Dec. 1955, p. 496-503.

Type and shape of the test samples and the welded spots; hardness test on welded seams; structure of the fractured surface. Tables, graphs, diagram, photographs. 5 ref. (K9, Q27, M27, CI, ST)

129-K. Researches Into the Welding of Aluminum and Its Alloys. W. f. Pumphrey. *Aluminum Development Association, Research Report No.* 27, July 1955, 59 p.

Investigates problems of cracking above and below solidus, factors affecting quality of argon-arc welds, thermal effects of welding and the development of alloys with good welding and mechanical properties. Diagrams, graphs, micrographs, photographs, table. (K1, K2, Q general. Al)

130-K. Steel Castings. Their Engineering Advantages in Weldments. E. J. Wellauer. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 569-574.

Steel castings in weldments increase product value because simplified manufacturing and inspection techniques can be used. Photographs, graphs. 11 ref. (K general, ST)

131-K. 'Thermal Barrier' Puts Emphasis on Precision Forming Techniques. George L. Christian. *Aviation Week,* v. 64, Jan. 30, 1956, p. 62-63, 65-66.

Welding techniques for fabricating high-strength steels and titanium alloys. Photographs. (K1, K3, AY, Ti)

132-K. Innovation in Soldering. *Chemical and Engineering News,* v. 34, Jan. 30, 1956, p. 498.

Good bond is obtained by first roughening surface to be soldered with a grinding wheel loaded with a soft solder. Ceramics and difficult metals have been joined by this method. (K7)

133-K. Torsion Bars Control Torque in Nut Running Tools. *Iron Age,* v. 177, Jan. 26, 1956, p. 76-77.

High-speed nut running tools are now available which use adjustable torsion bars to hold torque within a 15% total variation from required mean figure. Photographs. (K13)

134-K. Shrink Fitting Gets a Boost. R. L. Henderson. *Steel,* v. 138, Jan. 30, 1956, p. 88-89.

Small oven with 12 1000-watt infra-red tubes quickly reaches high temperatures. Used to expand bearing assemblies and shrink fit gears quickly and efficiently. Photographs, graph. (K13)

135-K. The Welding of Clad Steels. J. Hinde. *Welding and Metal Fabrication,* v. 24, Jan. 1956, p. 11-15.

Choice of welding process, set-up and alignment procedures, downhand butt, vertical and overhead butt, fillet and other forms of welding. Diagrams, tables, graphs. (To be continued.)
(K1, ST, SS, Ni)

136-K. (German.) Regularities of Intergrowth Phenomena of Crystals. III. Theory of Press-Welding of Metal Bodies. Friedrich Erdmann-Jesnitzer and Wolfgang Wichmann. *Zeitschrift für Metallkunde,* v. 46, no. 12, Dec. 1955, p. 854-859.

Tempering of cold compressed aluminum cylinders. Effect of surface preshaping on the solidifying temperature. Comparative observation of adhesion theory. Tables, graphs, photographs, micrographs. 20 ref. (K5, M26, Al)

137-K. Adhesive Bonding of Metals. Samuel N. Muchnick. *Mechanical Engineering,* v. 78, Jan. 1956, p. 19-22.

Effect of various surface treatments for aluminum, stainless steel, magnesium and titanium on strength of adhesive-bonded joints. Contact angle which a water drop makes with treated surface shown to be effective tool for evaluating adequacy of surface treatment. Theoretical basis presented for bonding of metals by organic adhesives. Graph, table. (K12, Al, SS, Mg, Ti)

138-K. What's Ahead in Nonmanual Welding? Paul Reed. *Oil and Gas Journal,* v. 54, Feb. 6, 1956, p. 80-84.

Possible applications of nonmanual welding processes to pipe line operations. A new carbon dioxide process appears most promising, while several other processes show possibilities. Diagrams, photographs, graph. (K general)

139-K. Fabrication of Crosshead Beams for the World's Largest Forging Press. V. M. Nigriny. *Welding Journal,* v. 35, Jan. 1956, p. 9-18.

Preliminary tests and actual welding process. Successful results show that submerged arc welding can be used on heavy sections regardless of length or thickness. Photographs, diagrams, table, macrographs. (K1, T5, ST)

140-K. Carbon-Dioxide-Shielded Consumable-Electrode Arc Welding. G. R. Rothschild. *Welding Journal,* v. 35, Jan. 1956, p. 19-29.

Under carefully controlled operating conditions, carbon-dioxide-shielded arc welding of mild steel gives excellent results at low cost. Photographs, tables, graphs, radiograph. 13 ref. (K1, ST)

141-K. All-Welded 96-Ft. American-Built Motor Yacht. LaMotte Grover and E. H. Holder. *Welding Journal,* v. 35, Jan. 1956, p. 30-39.

Design and construction of all-welded pleasure craft in which distortion is controlled and noise and vibration are reduced to a minimum. Photographs, diagrams, table. (K1, ST)

142-K. Recent Developments in Inert-Arc Welding. F. J. Pilia. *Welding Journal,* v. 35, Jan. 1956, p. 40-46.

Research and development have brought inert-gas metal-arc welding and inert-gas tungsten-arc welding to the point where they are considered precision tools, aiding in the reduction of manufacturing costs. Photographs. (K1)

143-K. Welding an Aluminum Dump Body. W. C. Weltman, Jr. *Welding Journal,* v. 35, Jan. 1956, p. 49-50.

New alloys and welding methods make the use of aluminum in truck bodies practical. Welding procedures described. Photographs. (K1, Al)

144-K. The Effect of I^2R Heating on Electrode Melting Rate. J. L. Wilson, G. E. Claussen and C. E. Jackson. *Welding Journal,* v. 35, Jan. 1956, p. 1S-8S.

Electrode melting rate is equal to sum of arc melting rate and I^2R melting rate of extension. Procedures and results of experimental melting rate determinations. Tables, photographs, graphs. 8 ref. (K1, ST, Al, Cu)

145-K. Austenitic Electrode of the 20% Cr, 10% Ni, 6% Mn, Ti Type for Automatic Welding. T. M. Slutskaya and S. M. Gurevich. *Henry Brutcher Translation No.* 3606, 15 p. (From *Avtomaticheskaya svarka,* v. 8, no. 3, 1955, p. 51-59.) Henry Brutcher, Altadena, Calif.

Hot cracks in the weld are caused by oxygen and sulfur. An electrode of chromium, nickel, manganese and titanium with flux "AN-22" was most satisfactory. Tables, micrographs. 15 ref. (K1, T5, AY)

146-K. The Marvibond Process. Willard de C. Crater. Paper from "The User Speaks About Magnesium". Magnesium Association, 6 p. + 3 plates.

Advantages of coating magnesium with plastic as used on luggage. Graphs, photographs. (K11, T10, Mg)

147-K. (French.) **"Riv-Cle"-Rivets and the Joining of Sheets Accessible Only on One Side.** B. Adaridi. *Revue de l'aluminium,* v. 32, no. 226, Nov. 1955, p. 1037-1041.

Several schemes to solve this problem are compared; details of the Riv-cle system diagrammed. Diagrams, photograph. (K13)

148-K. (Hungarian.) **Voltage and Characteristics of Electrical Welding Machines.** Karoly Kurutz. *Elektrotechnika,* v. 48, no. 12, Dec. 1955, p. 367-377.

Service conditions are based on static and dynamic characteristics. Dynamic properties are resolved. Graphs, diagrams. (K1)

149-K. (Russian.) **Electrical Butt Contact Welding in Pipe-Line Construction.** F. I. Kisliuk. *Neftianoe khoziaistvo,* v. 33, no. 12, Dec. 1955, p. 77-84.

Demonstrated on pipe-lines 300 to 500 mm. in diameter in the field, by means of a device equipped with a ring-transformer. Tables, diagrams, photographs. 4 ref. (K6, ST)

150-K. (Russian.) **Method of Determining Fluidity of Weld Metal.** A. A. Erokhin. *Zavodskaia laboratoriia,* v. 21, no. 12, 1955, p. 1466-1468.

Effect of arc-welding factors, including electrodes, flux, welding current, arc voltage and welding speed on weld-metal fluidity. Table, diagram. (K1, K9)

151-K. (Spanish.) **Study of Losses in the Consumption of Electrodes.** A. Pérez A. Quinones. *Ciencia y técnica de la soldadura,* v. 5, no. 27, Nov.-Dec. 1955, p. 1-3.

Factors that intervene in losses produced when the welder leaves the point of the electrode at an excessive length. Tables, graphs. (K1, ST)

152-K. Welding in the Steel Tube Industry. J. W. Atherton. *Australasian Engineer,* Dec. 1955, p. 51-53.

Applicability of welding and oxy-cutting to the maintenance, repair and construction problems of the tube industry. Photographs. (K1, K2, K3, F26, CN)

153-K. Projectiles Welded Automatically. V. N. Hansford. *Automation,* v. 3, Feb. 1956, p. 72-76.

Mechanism and operation of automatic machine producing welded rotating band on projectiles. Photographs, diagrams. (K1)

154-K. Some Aspects of Stainless Alloy Metallurgy and Their Application to Welding Problems. M. C. T. Bystram. *British Welding Journal,* v. 3, Feb. 1956, p. 41-46.

Influence of stainless alloying elements discussed on basis of Schaeffler's diagram, service conditions ranging from −200 to +900° C. being taken into account. Graphs, tables, micrographs. (K1, SS)

155-K. Practical Relationships Between Arc Energy, Fillet Size, and Amount of Electrode Used in Metal-Arc Welding. B. J. Bradstreet. *British Welding Journal,* v. 3, Feb. 1956, p. 59-61.

Relationship between certain metal-arc welding variables and sizes of the resulting welds summarized in formulas and graphs. (K1, ST)

156-K. Adhesives as a Design Tool. Arthur E. Kott. *Electrical Manufacturing,* v. 57, Feb. 1956, p. 87-93.

Major types of adhesives and their properties related to types of materials to be joined and to product applications. Diagrams, photographs, tables. 4 ref. (K12)

157-K. Effect of Fluxes on Soldered Connections. A. Z. Mample. *Electrical Manufacturing,* v. 57, Feb. 1956, p. 124-128.

Advantages of water-white rosin flux, for electrical and electronic wire joints over activated and proprietary fluxes, include a low melting point, possession of a controlled natural acid and a flux residue that is nonconductive, noncorrosive and nonhygroscopic. Graphs, tables. (K7)

158-K. Roll Welding Precious Metals for Telephone Contacts. A. L. Quinlan. *Electrical Engineering,* v. 75, Feb. 1956, p. 154-157.

Roll-welding circuits, equipment and layout, with special reference to welding of heavier tapes of precious metals. Specific applications. Diagrams, table, photographs. 1 ref. (K3, EG-c)

159-K. Nomograph Selects Size of Wire for Brazing. *Materials & Methods,* v. 43, Jan. 1956, p. 129.

Nomograph can be used to indicate wire diameter needed to silver braze a joint with known diameter, shear depth and clearance, or to de-

termine length of wire needed to make a joint if a given wire gage is available. Diagram. (K8)

160-K. Flash Welding Jet Engine Rings. Arthur G. Portz. *Metal Progress,* v. 69, Feb. 1956, p. 67-71.

Flash welded rings have replaced forgings and castings in jet engine applications because of the savings in machining that are realized. To maintain the welding quality required, eight different variables must be predetermined and controlled. Photographs, graph, micrographs. (K3)

161-K. Automatic Riveting of Pierce Blank Templates. D. V. Montooth. *Western Machinery and Steel World,* v. 47, Feb. 1956, p. 80-81.

Drivmatic riveter has cut assembly time by 90%. Photographs. (K13, ST, Al)

162-K. Joining Aluminum to Stainless Steel. Morton C. Smith and David D. Rabb. Paper from "Proceedings of the 1954 Cryogenic Engineering Conference". NBS Report 3517, p. 39-48.

In the construction of transport Dewar flasks for liquefied gases, the many joints must be vacuum tight. Four successful methods included use of copper-plated, ultrasonic-timed and friction-timed aluminum, and aluminum-to-copper, joined to stainless steel tubing. Micrographs. (K7, SS, Al)

163-K. (Czech.) **Substitution of Welded for Cast Constructions and the Use of Cast Parts in Welded Constructions.** M. Hauner. *Strojirenstvi,* v. 5, no. 12, Dec. 1955, p. 888-893.

Factors determining choice of technology, methods of combining welded and cast parts in construction of machines, welding of castings. Diagrams, photographs. 15 ref. (K general, ST)

164-K. (Czech.) **Use of Induction Heating for Heat Treatment During Welding.** T. Unger. *Strojirenstvi,* v. 5, no. 12, Dec. 1955, p. 917-922.

Advantages of induction heating in welding of highly stressed parts, choice of frequency in relation to depth of heating, welding copper pipe of induction coils. Photographs. 7 ref. (K6, J2)

165-K. (Czech.) **Problems of the Present State of Resistance Welding.** Milan Vltavsky. *Zvaranie,* v. 4, no. 8, Aug. 1955, p. 232-238.

Design and operation of welding machines for spot and seam welding. Electronic control methods. Photographs, diagrams. (K3)

166-K. (Czech.) **Butt-Resistance Welding of High Speed Steel.** Boleslav Vrana. *Zvaranie,* v. 4, no. 8, Aug. 1955, p. 241-250.

Causes of defects in butt-resistance welded cutting tools. Describes economical welding using welding press. Diagrams, graphs, micrographs. (K3, TS)

167-K. (Czech.) **Government Decisions Concerning Mechanization in the Machinery Manufacturing Industry and Mechanization in Resistance Welding.** Boleslav Vrana. *Zvaranie,* v. 4, nos. 9-10, Sept. 1955, p. 260-264.

Report on existing and planned expansion of the use of automatic resistance welding equipment of foreign and Czech manufacture. Designs and operation discussed. Diagrams, photograph. (K3)

168-K. (Czech.) **Influence of Hydrogen in Welding of Air-Hardened Low-Alloy Steels.** Karel Mazanec and Karel Pawera. *Zvaranie,* v. 4, nos. 9-10, Sept. 1955, p. 264-269.

Effect of hydrogen on crack sensitivity of base metals welded with unalloyed ferritic-pearlitic coated electrodes. (K1, ST)

169-K. (Czech.) **The Influence of Granulation of Flux Z41 on the Geometrical Size and Quality of Welds.** Zdenek Duben and Jaromir Lukasek. *Zvaranie,* v. 4, nos. 9-10, Sept. 1955, p. 277-283.

Owing to its high manganese content, the flux is suitable for welding most low-carbon and some alloy steels. Three grades of flux are recommended, according to grain size. Tables, graphs, diagrams, photographs. 2 ref. (K1)

170-K. (Czech.) **Contribution to the Technology of Semi-Automatic Welding.** Zdenek Bajer. *Zvaranie,* v. 4, nos. 9-10, Sept. 1955, p. 294-295.

Evaluation of technological properties. Advantages of alternating current over direct current, with respect to electric power consumption, flux and welding wire used, depth of heat-affected zone, weld formation. Tables. (K1)

171-K. (Czech.) **Repairing Cracked Valve and Pump Casings by Welding.** Antonin Kleander. *Zvaranie,* v. 4, nos. 9-10, Sept. 1955, p. 308-315.

Repair methods for sizable cracks in low-alloy or unalloyed steel forgings or castings of large size and subject to high pressures. Weldability, composition and mechanical properties of steels; recommended repair techniques. Tables, diagrams, photographs.

(K1, K9, Q general, ST, AY, CN)

172-K. (German and French.) **Gas-Welding.** K. Boeckhaus. *Zeitschrift für Schweisstechnik,* v. 46, no. 1, Jan. 1956, p. 11-17.

Application of welding to cutting, surface treatment and heat treatment of metallic and nonmetallic materials. Joining by hand, welding under pressure, hard surfacing, cladding and soldering. Table, graphs, diagrams, photographs. (To be continued.) (K2, K7)

173-K. (Slovak.) **Problems in the Present State of Resistance Welding.** *Zvaranie,* v. 4, nos. 9-10, Sept. 1955, p. 287-294.

Process and regulation electronic control, resistance welding in aircraft construction, advantages of spot welding, welding of light metals, advantages of three-phase system, types of resistance welding. Tables, photographs, diagrams. 8 ref. (K3, ST, EG-a)

174-K. The Use of Cold Cathode Counting Tubes for the Control of Resistance Welding. T. W. Brady. *Electronic Engineering,* v. 28, Feb. 1956, p. 70-74.

A digital system for controlling resistance welding employs valves developed in the last few years. Diagrams, photographs. 1 ref. (K3)

175-K. Pressure Welding of Metals and Alloys. R. Narayanan, L. J. Balasundaram and R. C. Deshpande. *Indian Institute of Science, Journal,* v. 38, sec. B, Jan. 1956, p. 14-19 + 2 plates.

Experimental procedure and results of solid phase welding of aluminum to aluminum at 200 to 450° C. and aluminum to 60:40 brass at 400 to 500° C. Graphs, photographs. 15 ref. (K2, Cu, Al)

176-K. The 37½° Bevel for Pipeline Welding. R. G. Strong. *Industry & Welding,* v. 29, Feb. 1956, p. 46-48, 51, 115.

Outlines advantages of 37½° over 30° bevel as shown by results obtained in using both types of bevel on 2000 miles of pipeline. Photographs. (K1)

177-K. How to Speed Production With CO_2 Welding. *Industry & Welding,* v. 29, Feb. 1956, p. 80-81.

Brief discussion of application of inert gas-shielded arc process using carbon dioxide as a shield in production of refrigerator compressor shells. Problem of leaks due to spatter eliminated by using a short arc length and replacing gas nozzle with a copper tube to bring carbon dioxide to the arc. Photographs. (K1)

178-K. Techniques for Inert Arc Welded Repair of Aluminum Sand Castings. E. R. Kellogg. *Industry & Welding,* v. 29, Feb. 1956, p. 125-127.

Method for repairing defects using aluminum welding rod to match composition of castings, thoriated tungsten electrodes and argon shielding gas. After color buffing, welded spots cannot be detected without optical equipment. Photographs. (K1, E11, Al)

179-K. Brazed Joints. Design Assembly Heating Methods. A. N. Kugler. *Machine Design,* v. 28, Feb. 23, 1956, p. 116-122.

Successful brazed joints largely depend upon the degree of planning in design, assembling joint members and selecting a suitable heating method. Diagrams, photographs. (K8)

180-K. Cores & Adhesives for Aluminum Curtain Wall Panels. J. M. Roehm. *Modern Metals,* v. 12, Feb. 1956, p. 42 + 4 pages.

Comprehensive study of adhesives and core materials used in producing sandwich-type panels. Design criteria. Photographs. (K12, Al)

181-K. The Brass Takes a Welding Course. *Steel,* v. 138, Feb. 20, 1956, p. 108-111.

Welding course for management, supervisory personnel and design engineers results in better teamwork, reduced costs, better products. Photograph, diagrams, table. (K general, A3)

182-K. Filler Metals for Joining. Orville T. Barnett. *Welding Engineer,* v. 41, Feb. 1956, p. 31-32, 34.

Surveys use of filler metals in arc welding. Photographs, diagram, tables. 3 ref. (K1)

183-K. (Russian.) **Automatic Arc Welding of L62 Brass.** A. A. Alov and V. T. Zolotykh. *Svarochnoe proizvodstvo,* no. 1, Jan. 1956, p. 1-4.

Experiments showed that by welding brass parts with a thickness of 3 to 4 mm., the resulting joints had sufficient mechanical properties at 180° bending; and m1 or m2 electrode copper wire should be used in welding under flux, but for sheet-brass, the boron-silicon flux MaTI-53 is suggested. Table, diagram, micrograph, photographs. (K1, Cu)

184-K. (Russian.) **Intercrystalline Cracks in Welded Joints of Aluminum Alloys.** S. V. Lashko-Avakian, N. F. Lashko and V. V. Orlova. *Svarochnoe proizvodstvo,* Jan. 1956, no. 1, p. 13-18.

The solidified part of metal is subjected to a substantial plastic

deformation during crystallization. The upper limit of crystallization interspace, for the alloy system crystallizing with a formation of solid solution and eutectic, has a minimum and a maximum at a eutectic volume of 4 to 6%. Graphs, diagrams, micrographs. 11 ref. (K9, Q24, N12, Al)

185-K. Role of Surface Energies and Wetting in Metal-Ceramic Sealing. W. D. Kingery. *American Ceramic Society Bulletin,* v. 35, Mar. 1956, p. 108-112.

Determination of wetting behavior by surface and interface energies; relationship of surface energy, wetting properties, metal-ceramic sealing process. Diagrams, table. 14 ref. (K11, P10)

186-K. Trends in Design of Ceramic-to-Metal Seals for Magnetrons. Leo J. Cronin. *American Ceramic Society Bulletin,* v. 35, Mar. 1956, p. 113-116.

Transition from glass through glass-bonded ceramics to ceramic-to-metal seals; specific test for evaluation of ceramics and their bonding strength; stress-strain relationships. Diagram, graphs, photographs, table. (K11)

187-K. Applying a Semi-Automatic Welding Process in the Maintenance Field in the Copper Smelting & Refining Industry. J. Hallenan. *Australasian Engineer,* Jan. 1956, p. 53-57.

Examples showing value of a semi-automatic welding machine for maintenance work. Diagrams. (K1, C21, ST, Cu)

188-K. Techniques for Inert Arc Welding Heavy Aluminum Plate. J. A. Gowen. *Industry & Welding,* v. 29, Mar. 1956, p. 54-56, 71.

Process used for aluminum welds as long as 15 ft., maintaining rigid Navy specifications. Weld deposits are so smooth no finishing grinding is required. Photographs. (K1, G18, Al)

189-K. Ceramic Fixtures Are Key to "Brazing by Automation". *Industry & Welding,* v. 29, Mar. 1956, p. 62 + 6 p.

Problems causing high costs of conventional production brazing. Advantages of ceramic fixtures. Tables, photographs, diagram. (K8)

190-K. "Cold Weld" Nickel Alloys for Atom Plant Use. E. Nutter. *Iron Age,* v. 177, Feb. 16, 1956, p. 111-113.

An inert-gas arc welding technique which insures sound, pore-free joints in a nickel alloy pump; process features low temperatures, an argon gas shield and multiple passes with small diameter rod. Diagrams, photographs. (K1, Ni)

191-K. Fluxless Aluminum Joining Avoids Joint Corrosion. Samuel Freedman. *Iron Age,* v. 177, Mar. 1, 1956, p. 71-73.

Recently developed self-fluxing aluminum solder joins easily and economically at low temperature. Presence of aluminum oxide surface film can be ignored. Compatible zinc-lead blend bonds securely with parent metal. Table, micrograph, photograph. (K7, Al, Zn, Pb)

192-K. Pushbutton Setup Welds Aluminum Tubing Joints. Robert Loose. *Iron Age,* v. 177, Mar. 1, 1956, p. 80-81.

In evaporator assemblies for refrigerators, aluminum coils are brazed to aluminum sheet. Connection of the pipes extending from the coil to the remainder of the system is done, in part, by Heliarc welding of aluminum-to-aluminum joints and by silver brazing copper joints. Circular welds are produced in two ways. Photographs. (K1, K8, Al, Cu)

193-K. High-Speed Welder Tests Own Joints. Glen Farrington. *Iron Age,* v. 177, Mar. 15, 1956, p. 96-97.

Soon to be installed welder will test its own joints to a 4000-lb. pull at 800 per hr. Flanged rods are automatically weld fabricated from stamped washers and thick coil stock. Photographs. (K3)

194-K. Engineering for You and Me. II. Strength, Fatigue, Failure in Fasteners. Harry Conn. *Machine and Tool Blue Book,* v. 51, Mar. 1956, p. 105 + 12 pages.

Mechanical, physical, chemical properties of metals; factors that cause failures in dynamically stressed parts. Tables, graphs, diagrams. 3 ref. (K13)

195-K. Manufacture of Spot Welded Automobile Wheels. Milton H. Grams. *Metal Progress,* v. 69, Mar. 1956, p. 63-67.

Replacing of riveting lines by four-gun spot welding machines relieved bottleneck in production of automobile wheels. Welded wheels are stronger and can be assembled automatically with greater control of quality. Photographs. (K3)

196-K. Room-Temperature Bonding. Jerome L. Been. *Modern Plastics,* v. 33, Mar. 1956, p. 126 + 6 pages.

New high-strength fastening possibilities for plastics and other components. Photographs, graphs. (K12)

197-K. The Use and Welding of Aluminium in Shipbuilding. N. T. Burgess. *Sheet Metal Industries,* v. 33, no. 346, Feb. 1956, p. 138-141.

Short review of inert-gas methods, welding aluminum-magnesium alloys, self-adjusting arc welding, radiography of welds, training of welders, materials and design, filler alloys, testing of welded aluminum structures. (K1, T22, Al, Mg)

198-K. How Tight Is Tight? Charles W. Quillen. *Steel,* v. 138, Feb. 27, 1956, p. 114-115.

Stall-type pneumatic tools are used to tighten nuts and bolts automatically. Operator needs only to check air pressure and bring tool to a complete stall. Photographs. (K13)

199-K. Brazing With Silver Alloys. Allen W. Swift. *Tool Engineer,* v. 36, Mar. 1956, p. 91-95.

Case histories of four representative problems of production requirements: precision brazing; fixtures for high production; odd joint angles; hard-to-handle tubing and castings. Photographs, diagram. (K8, Ag)

200-K. Automatic Butt Welding of High Pressure Pipes. *Welding and Metal Fabrication,* v. 24, Feb. 1956, p. 56-58.

Consists of bringing the faces to be joined together under a minor load and heating by means of a multi-jet oxy-acetylene oscillating ring burner until a pre-set thermal expansion is reached. A second higher or control load is then applied to return the pipe to its original length, when the final butting pressure operates to complete the weld. Diagram, micrograph, photographs. (K2)

201-K. The Welding of Clad Steels. II. J. Hinde. *Welding and Metal Fabrication,* v. 24, Feb. 1956, p. 59-62.

Procedures for welding of clad steels, including Monel, Inconel, austenitic stainless, plain chromium stainless, and nickel. Tables, diagrams, photographs. 16 ref. (K1, L22, Ni, ST)

202-K. High Speed Welding of Steel Compressor Cases. C. F. Stephenson and R. A. Stone. *Welding Journal* v. 35, Feb. 1956, p. 113-121.

Successful application of inert-gas metal-arc welding to the production of a hermetic line of compressors for room air conditioners and refrigeration. Tables, diagrams, photographs. (K1)

203-K. Welding of High-Temperature High-Pressure Piping With Chrome-Moly Electrodes. Lloyd C. Nesbitt. *Welding Journal,* v. 35, Feb. 1956, p. 129-135.

Chrome-Moly E-XX15 low-carbon, low-hydrogen electrodes have been developed to produce satisfactory welds on ferritic chromium-molybdenum steels. Photographs, graph, tables, micrographs. 2 ref. (K1, AY)

204-K. Mechanized Brazing of Fan Components. Frank G. Leuthner. *Welding Journal,* v. 35, Feb. 1956, p. 136-141.

Large savings are realized with unique semi-automatic brazing method using a powdered filler metal and the proper flux. Photographs, tables. (K8, Ag)

205-K. Characteristics of a Rectifier-Type Constant-Voltage Power Supply. J. W. Pomazal. *Welding Journal,* v. 35, Feb. 1956, p. 142-144.

Principle of operation, characteristics of a rectifier power supply of the type being used in multiple-operator welding installations. Photograph, diagrams, graph, table. (K1)

206-K. The Carbon-Dioxide-Shielded Metal-Arc Welding Process. R. J. Keller and J. Koss. *Welding Journal,* v. 35, Feb. 1956, p. 145-151.

High potential for welding cost reduction and excellent weld metal quality are advantages claimed for this process. Photographs, graph, tables. (K1)

207-K. A Test Block for Welding Gray and Nodular Cast Irons. Willerd A. Schumbacker and Anton L. Schaeffler. *Welding Journal,* v. 35, Feb. 1956, p. 91S-97S; disc., 97S-99S.

Simple test developed to discriminate between the many welding procedures and filler metals available for welding gray and nodular castings. Photograph, diagrams, tables, micrographs. (K9, CI)

208-K. Effect of Current and Atmospheres on Arc Temperatures. G. M. Gordon, Olga A. Cotter and E. R. Parker. *Welding Journal,* v. 35, Feb. 1956, p. 109S-112S.

Problems involved in measuring and mapping the temperatures in the arc stream and early progress made on this project. Tables, graphs, spectrum. 8 ref. (K1)

209-K. The Application of Welding in Japanese Hydro-Electric Projects. Teikichi Kamiya and Toshie Okumura. *British Welding Journal,* v. 3, Mar. 1956, p. 83-89.

Development and use of welding for steel penstocks, surge tanks,

turbine casings and vortex rings. The steel plates used for penstocks and turbine components are tending to become thicker as the capacity of power plants increases. The use of local field annealing for thick steel plates described. Photographs, diagrams, graph, tables. (K1, K2, J1, ST)

210-K. The Weldability and Mechanical Properties of a Series of Mn-Ni-Cr-Mo Steels. C. L. M. Cottrell, B. J. Bradstreet and T. E. M. Jones. *British Welding Journal,* v. 3, Mar. 1956, p. 90-98 + 2 plates.

A series of experimental low alloy steels have been examined for hard-zone crack sensitivity by the controlled thermal severity (C.T.S.) test. C.T.S. tests were carried out using low-hydrogen metal arc-welding electrodes. Estimates made of safe upper limit of hardness in the heat affected zone to avoid cracks when welding low alloy steels with low-hydrogen electrodes. Tables, diagram, graphs. 6 ref. (K9, Q29, AY)

211-K. A Review of Literature on the Causes of Porosity in Steel Welds. A. R. Muir. *British Welding Journal,* v. 3, Mar. 1956, p. 98-102.

Occurrence of porosity in steel weld metal considered in light of present-day knowledge. It is thought that gas evolution may be due to solubility changes or chemical reactions. The methods of entry of soluble gases into the weld have been considered and it is thought that entry may be achieved by primary solution in the welding slag and partition between this and the weld metal. Tables. 31 ref. (K9, ST)

212-K. Propane and Metalworking. Sidney Smith. *Canadian Metals,* v. 19, Feb. 1956, p. 20 + 4 pages.

Applications and proper usage of propane in metalworking industry. Diagrams, photographs, table. (K2, G22)

213-K. Arc Welding in the Petroleum Industry. K. D. Taylor. *Canadian Metals,* v. 19, Feb. 1956, p. 29-30.

A brief discussion of welding low-alloy piping, stainless steels, and carbon steels, particularly for low-temperature service. (K1, ST)

214-K. How to Weld Zirconium. Hugh Justis and Chester Lawrence. *Iron Age,* v. 177, Mar. 22, 1956, p. 79-81.

Fusion and resistance welding techniques. Fusion welding requires inert atmosphere. Tables, photographs, micrograph. (K1, K3, Zr)

215-K. Brazing Catches Up. *Steel,* v. 138, Mar. 26, 1956, p. 126-129.

Details, advantages, recent applications. Photographs. (K8)

216-K. Arc-Welding Titanium. J. C. Barrett, R. W. Huber and I. R. Lane, Jr. *U. S. Bureau of Mines, Report of Investigations* 5178, Jan. 1956, 50 p.

Resume of experiments conducted by Bureau of Mines since 1948 demonstrates that process is successful if conducted under proper conditions. Includes welding of prototypes. Photographs, micrographs, tables, graphs. 10 ref. (K1, Ti)

217-K. Control of Welding for Jet Engine Canware. R. Bushell. *Welding and Metal Fabrication,* v. 24, Mar. 1956, p. 76-85.

Precautions and considerations necessary in modern aircraft fabrication. Diagrams, photographs. (K1)

218-K. The Welding of Galvanized Steel. A Review of Recent Literature. P. W. Jones. *Welding and Metal Fabrication,* v. 24, Mar. 1956, p. 98-101.

Notes lack of information on arc-weld strength. Fumes and hygiene considered. 48 ref. (K1, L16, A7)

219-K. Permeability and Crack Sensitivity of Stainless Welds. John L. Lang and Charles Wright. *Welding Journal,* v. 35, Mar. 1956, p. 225-228.

Base metal Types 302 and 304 and methods of evaluation. Shop practices utilizing manual, submerged-arc and consumable electrode inert-gas-shielded arc welding of Types 302 and 304 stainless steel crankcases and flywheels. Photographs, graphs, tables, diagrams. (K1, SS)

220-K. The Development and Investigation of High-Tensile High-Impact Electrodes. G. S. Wepfer. *Welding Journal,* v. 35, Mar. 1956, p. 229-235.

An electrode was developed that can be classified as an E11015-type with a chemical analysis of 3.50% nickel and 0.50% molybdenum. This electrode has a yield strength of 95,000 psi. and a tensile strength of 110,000 psi. in either the as-welded or stress-relieved conditions. The weld metal does not become embrittled when stress relieved and the impact properties are very good at both normal and subzero temperatures. Photograph, tables, diagrams. (K1, Q23, T5)

221-K. Transient Problems With High-Flux Density Transformers in Welding Applications. R. C. Mierendorf. *Welding Journal,* v. 35, Mar. 1956, p. 236-242; disc., p. 243.

Magnetizing transients may be

successfully predicted when the characteristics of the welding transformer are available and the power factor of the welding transformer itself will determine the optimum initiation angle. Photograph, graphs. 3 ref. (K1, K3)

222-K. A New Approach to the Automatic Welding of Alloy Steels. Emmett Smith and Paul Jerabek. *Welding Journal,* v. 35, Mar. 1956, p. 244-247.

Many new possibilities are opened by using alloy fluxes with mild-steel electrodes or modifying weld deposits where standard available electrode compositions are used. Photographs, graph, tables, diagram. (K1, AY)

223-K. Effect of Individual Coating Ingredients on Surface Tension of Iron Electrodes. Thomas H. Hazlett and Earl R. Parker. *Welding Journal,* v. 35, Mar. 1956, p. 113s-114s.

Coating materials found to reduce the surface tension considerably below the value for the bare electrode. Diagrams, photograph, table. 2 ref. (K1, P10, T5, Fe)

224-K. Optimum Spot and Seam Welding Conditions for Inconel "W". Ernest F. Nippes, Warren F. Savage and Khosrow L. Moazed. *Welding Journal,* v. 35, Mar. 1956, p. 127s-136s.

Results of research investigation indicate that the optimum conditions for spot and seam welding Inconel W are much the same as those for Inconel X. Tables, photographs, diagrams, graphs, micrographs. 7 ref. (K3, Ni)

225-K. Welding of High-Strength Stainless Steels for Elevated-Temperature Use. J. J. Vagi and D. C. Martin. *Welding Journal,* v. 35, Mar. 1956, p. 137s-144s.

Several high-strength stainless steels were found to be weldable under conditions of high restraint using the inert-gas-shielded tungsten-arc process. Tables, diagrams, photograph, micrographs. (K1, SS)

226-K. Analysis of the Direct-Current Arc. Alan D. Morris and Willis C. Gore. *Welding Journal,* v. 35, Mar. 1956, p. 153s-160s.

Mechanism of power transfer to the anode, the formation and extent of the cathode region and the power dispersal in the arc are some of the phenomena which are evaluated and discussed. Photographs, tables, graphs, diagram. 38 ref. (K1)

227-K. (German.) **Light-Weight Construction of Welded Generators for Hydroelectric Power Stations.** G. Barby and R. Simon. *Schweissen und Schneiden,* v. 8, no. 1, Jan. 1956, p. 9-14.

Welding process in construction of beams and parts of hydroelectro generators. Diagrams, photographs, graph. (K general, ST)

228-K. (German.) **Welding of Hydroelectric Station Machinery and Electrical Equipment.** S. Malamet. *Schweissen und Schneiden,* v. 8, no. 1, Jan. 1956, p. 19-26.

Basic problems of welding in construction of parts of hydropower station equipment, according to data from experience. Photographs, graph, diagrams. (K general, ST)

229-K. (German.) **New Austrian Penstocks and Pressure Shafts.** Ernst Chwalla. *Schweisstechnik,* v. 9, no. 12, Dec. 1955, p. 133-136.

Welding procedure for hydropower station water pipes. Photographs. (K general, ST)

230-K. (Russian.) **Cold Electro Welding of Cast Iron.** A. E. Asnis and Iu. V. Latash. *Liteinoe Proizvodstvo,* 1956, no. 1, Jan. 1956, p. 6-8.

Welding with different types of electrodes. Diagrams photographs, micrographs. 9 ref. (K1, CI)

231-K. The Arc Welding of Aluminum. *Aluminium Development Association, Information Bulletin No.* 19, Dec. 1955, 92 p.

Descriptions and operating data for all the electric arc welding processes, with particular attention to inert-gas shielded-arc processes. Diagrams, tables, photographs. (K1, Al)

232-K. On the Nature of Intergranular Cracking of Welds at High Temperature. B. A. Movchan and L. A. Poznyak. *Henry Brutcher Translation No.* 3572, 19 p. (Abridged from *Avtomaticheskaya Svarka,* v. 8, no. 6, 1954, p. 59-72.) Henry Brutcher, Altadena, Calif.

Experiments on mechanism of intergranular fracture and on crystallization of chemically heterogeneous alloys, based on microradiography and X-ray diffraction. Chemical heterogeneity of columnar crystallites as a main factor inducing hot cracking; effect of weld metal and flux. Graph, photograph, micrographs, microradiographs, X-ray diffractograms. 27 ref. (K9, N12, SS)

233-K. (German.) **Tests on Cone Fastening of Aluminum and Steel.** Wilhelm Hofmann and Gerhard Kornberger. *Zeitschrift für Metallkunde,* v. 47, no. 2, Feb. 1956, p. 86-89.

The best bonding with cones of soft steel driven into aluminum was

obtained with cones having a silver or zinc coating. Graphs, diagrams. 1 ref. (K13, K4, Al, ST)

234-K. (Russian.) **Argon-Arc-Welding of High-Alloy Pipes.** A. T. Koniushenko, A. S. Iuzefovich, E. I. Bashkirova, F. V. Karamyshev, F. B. Diatlov and E. N. Khoroshev. *Stal',* v. 16, no. 2, Feb. 1956, p. 151-155.

Continuous method of welding pipes of different types of steel in which the welded joint strength is close to the strength of the base metal, without the use of any thermal treatment. Tables, graph, diagram, photographs, micrographs. (K1, AY)

235-K. (Russian.) **Effect of Nonfusions of Butt Welds of Steels 40 Kh and 55 on the Mechanical Properties of Welded Joints.** G. I. Pogodin-Alekseev and M. S. Savel'eva. *Svarochnoe Proizvodstvo,* 1956, no. 2, Feb. 1956, p. 1-4.

Improvement of strength and plastic characteristics of welded seams through heat treatment. Variation of notch toughness in relation to the size of the unfused zone. Effect of composition of steel and weld metal. Table, graphs, diagrams. 2 ref. (K3, Q23, CN)

236-K. (Russian.) **Choice of Methods for Testing Structural Steel for Weldability.** A. I. Krasovskii. *Svarochnoe Proizvodstvo,* 1956, no. 2, Feb. 1956, p. 6-13.

Testing methods (bending, impact and testing machines) in relation to main properties (strength and plasticity) of welded seams; conditions of use. Tables. 28 ref. (K9, Q23, CN)

237-K. (Book.) **Brazing Alcoa Aluminum.** 134 p. 1955. Aluminum Co. of America. Pittsburgh, Pa.

Practical shop data on brazing methods; effect of current knowledge of brazing processes on design. (K8, Al)

238-K. Inert Gas-Shielded Welding Arc Behavior and Metal Transfer Characteristics. G. M. Skinner and D. M. Yenni. *Applications and Industry,* 1956, no. 23, Mar. 1956, p. 28-32.

Influence of shielding-gas composition on arc stability, spatter formation and efficiency of metal transfer; some innovations in experimental methods and photography. Graph, photographs, tables. 3 ref. (K1, Al, ST)

239-K. Spot Welding of Ames Thorium. R. E. Monroe, D. C. Martin and C. B. Voldrich. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* BMI-725, Jan. 1952, 17 p.

Tests determined proper welding conditions and effects of varying welding time, pressure and current pattern on the strength of spot welds in thorium sheet. Micrograph, graphs, diagram, photograph, table. (K3, Th)

240-K. Five Metal Hydrides as Alloying Agents on Silicon. Miles V. Sullivan and John H. Eigler. *Electrochemical Society, Journal,* v. 103, Apr. 1956, p. 218-220.

Good ohmic contacts to both *n*- and *p*-type silicon were made. Graphs, diagrams, table, photographs. 2 ref. (K7, P15, Si)

241-K. Stainless Steel Argon-Shielded Arc Weld Tests. R. L. Heckman. *Hanford Atomic Products Operation (U. S. Atomic Energy Commission),* HW-12326, Mar. 17, 1949, 25 p.

Inherent characteristics of inert-gas shielded-arc welding. Tests designed to provide data concerning techniques to be used with this method to obtain best possible welds in the field. Techniques include heat treatment after welding, purging, and combinations of parent metal and filler rod to be used. Photographs, tables, graphs, micrographs. (K1, SS)

242-K. Consumable Electrode Inert Arc Welding of Magnesium. I. Paul Klain. *Industry & Welding,* v. 29, Apr. 1956, p. 50 + 7 pages.

Process and its advantages; shielding gas make-up. Graphs. (K1, Mg)

243-K. Resistance Welding Copper-Base Alloys. *Industry & Welding,* v. 29, Apr. 1956, p. 58-60, 89.

Welding requirements include higher currents, shorter time and lighter pressures than for mild steel. Tables. (K3, Cu)

244-K. Electronic Stopwatch Boosts Weld Quality. *Iron Age,* v. 177, Apr. 19, 1956, p. 106-107.

Cold cathode-type electronic circuits promise a precision in weld cycling excelled only by astronomical timers. Photograph. (K3)

245-K. Aluminum Alloys for Welding. W. M. Rogerson. *Machine Design,* v. 28, Apr. 19, 1956, p. 103-106.

Tempering effect, strength requirements, crack sensitivity, corrosion resistance and finish are important design considerations influencing selection of the best alloy and welding method. Tables, photographs. 1 ref. (K general, Q23, R general, Al)

246-K. Welding Rod Coatings Without Ferromanganese. (Digest of

"Some Experiments on High-Manganese Arc Welding Rods", by D. R. Dhanbhoora, S. Visvanathan and S.N.A. Narayan; *Tisco*, v. 2, Oct. 1955, p. 173-177.) *Metal Progress*, v. 69, Apr. 1956, p. 192.

Experiments to develop a coating free from ferromanganese which would enable good welds to be made with high-manganese wire. The best coating contained 16 parts silica, 10 parts manganese ore, 5 parts rutile, 4 parts mill scale, 4 parts bentonite, 2 parts of iron powder. (K1, Fe, Mn)

247-K. How Sound Are Inert-Gas-Tungsten-Arc-Root-Pass Wipe Welds? Helmut Thielsch. *Power Engineering*, v. 60, Apr. 1956, p. 78-80.

Examples of incipient failure, usually in design, and steps to avoid them. Diagrams, photographs. (K1)

248-K. Soldering and Printed Circuits. *Tin and Its Uses*, 1956, no. 34, p. 7-9, 15.

Essentials of electronic circuits, printed circuits, automatic assembly, requirements of the solder. Photographs. (K7, Sn-c)

249-K. Metal Adhesives. R. A. Johnson. *Welding and Metal Fabrication*, v. 24, Apr. 1956, p. 134-136.

Properties and applications of organic adhesives. Table, diagrams, photographs. (K12)

250-K. New Fastening Techniques at Douglas. John H. Stansbury and J. M. Rakestraw. *Western Machinery and Steel World*, v. 47, Apr. 1956, p. 102-105.

Multicycling devices for automatic riveting use available machines controlled by electronic mechanisms and programmed tape. Diagrams, photographs. (K13)

251-K. Automatic and Semi-Automatic Welding of Cast Steel With Carbon Dioxide as Inert Protective Gas. V. N. Suslov. *Henry Brutcher Translation No.* 3610, 10 p. (From *Svarochnoe Proizvodstvo*, 1955, no. 1, p. 14-17.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 130-K, 1955. (K1, CI)

252-K. A Semi-Automatic Machine for the Repair Welding of Steel Castings With a Consumable Electrode in a Carbon Dioxide Atmosphere. L. V. Golub. *Henry Brutcher Translation No.* 3611, 8 p. (From *Svarochnoe Proizvodstvo*, 1955, no. 1, p. 17-19.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 131-K, 1955. (K1, CI)

253-K. Electrodes for the Welding of Chrome-Molybdenum Steel. G. A. Ukolov. *Henry Brutcher Translation No.* 3681, 4 p. (From *Svarochnoe Proizvodstvo*, no. 7, 1955, p. 25-26.) Henry Brutcher, Altadena, Calif.

Development and composition of a new electrode coating for welding structural steel. Mechanical properties of weld metal at room tempearture and at 370° C. Tables. 2 ref. (K1, ST)

254-K. (German.) **Shielded Arc Welding of Non-Alloy Steels.** W. Hummitzsch and Fr. Mersmann. *Schweissen und Schneiden*, v. 8, no. 3, Mar. 1956, p. 73-79.

Welding under argon and carbon dioxide, requirements of gases, characteristics and advantages of method, quality of the welded joints, feasibility of the process. Tables, graphs, diagrams, photographs. 16 ref. (K1, CN)

255-K. (German.) **On Hot Cracking of Austenitic Chromium-Nickel-Welds.** Walter Hirsch and Hans Werner Fritze. *Schweissen und Schneiden*, v. 8, no. 3, Mar. 1956, p. 81-85.

Review of present state of knowledge. Table, graph, diagrams, micrographs. 13 ref. (K1, K2, Q26, SS)

256-K. (Russian.) **Study of Attainability of an Equilibrium in Welding With the Aid of Radioactive Tracers.** B. I. Bruk and S. F. Iur'ev. *Svarochnoe Proizvodstvo*, 1956, no. 3, Mar. 1956, p. 1-4.

Use of radioactive sulfur in study of equilibrium in arc welding at 100-250 amperes. Little improvement of equilibrium was gained by increasing welding current. Advantage of electrodes with lower viscosity of slag from flux coating outweigh disadvantage of lower basicity of the coating. Tables, graphs. 10 ref. (K1, S19)

257-K. (Russian.) **Influence of Technology of Welding on the Strength of One-Spot Joints Under a Variable Load.** A. I. Guliaev. *Svarochnoe Proizvodstvo*, 1956, no. 3, Mar. 1956, p. 4-8.

Influence of procedure, defects, spot shape, interstices between sheets and annealing after welding on the cyclic strength of low-carbon steel. Advantages of extra high electrode pressures. Nonadvisability of residual stress-relieving. Interstices between sheets reduce the cyclic strength of spot welds. Tables, graphs, diagrams. 9 ref. (K3, CN)

258-K. (Russian.) **Some Problems in Cold Pressure Welding of Metals.** S. B. Ainbinder. *Svarochnoe Proizvodstvo*, 1956, no. 3, Mar. 1956, p. 8-11.

A pretreatment of welding surfaces; relative advantages of various procedures. Welding of sheets and wires. Diagrams, photographs. 17 ref. (K5)

259-K. (Russian.) **Study of Weldability of 25L Steel.** M. M. Kraichik and N. V. Pashkov. *Svarochnoe Proizvodstvo,* 1956, no. 3, Mar. 1956, p. 17-20.

Attempts to determine optimum welding procedures for 25L steel, widely used in the Soviet railroad industry, to insure close approximation of the properties of the welded joint to those of the basic metals. Tables, graphs, photograph. 1 ref. (K9, ST)

260-K. (Russian.) **Welding of Gears Under a Carbon Dioxide Envelope.** N. N. Belous. *Svarochnoe Proizvodstvo,* 1956, no. 3, Mar. 1956, p. 20-22.

Method of automatic and semi-automatic arc welding of carbon and alloyed steels compared with semi-automatic welding under a layer of flux. The former method is shown to be more effective. Its main advantages are direct observability of the welding process, accuracy of joining and elimination of trimming slag and flux off the joint. Diagrams, photograph, tables. 5 ref . (K1, CN, AY)

261-K. (Russian.) **Welding of Thin-Walled Autoclaves Under Flux.** A. A. Khudoshina. *Svarochnoe Proizvodstvo,* 1956, no. 3, Mar. 1956, p. 23-24.

Procedures and problems in welding portable medical autoclaves. Jigs for securing accurate assembly. Tables, photograph, diagram. (K1, K2, ST)

262-K. Welding and the Structural Steelwork Industry. *British Welding Journal,* v. 3, Apr. 1956, p. 111-118.

Results of survey of the present position of welding in the structural steelwork industry; needs of the industry. Photographs. (K general, T26, ST)

263-K. The Case for Site Welding of Structures. G. H. Smith. *British Welding Journal,* v. 3, Apr. 1956, p. 119-126.

The application of site welding, and how the saving in materials and workmanship can more than compensate for the extra cost at site. Diagrams, photographs. (K1)

264-K. Welding Progress in a General Engineering Workshop. J. A. Edwards and J. O. H. Nice. *British Welding Journal,* v. 3, Apr. 1956, p. 127-134.

Improved welding techniques developed over past 25 years and applied chiefly to the construction of rotary vacuum filters, chemical plants, boilers and diesel engines. Photographs, tables. (K general)

265-K. How to Get More for Your Metalworking Dollar. III. Welding. Rod and Electrode Charts. *Iron Age,* v. 177, Apr. 26, 1956, p. 93-100 + 6 pages.

Welding processes and materials; charts for carbon and stainless steels, aluminum, copper, nickel and magnesium alloys. Photographs, tables. (K general, SS, Al, Cu, Ni, Mg)

266-K. Welding Composite Steels: Clad Steels. Helmut Thielsch. *Machine Design,* v. 28, May 3, 1956, p. 96-100.

Compares clad steels and applied liners; summarizes the welding of clad steels. Diagrams, photographs, tables. 5 ref. (K1, ST)

267-K. New Solders and Fluxes Speed Aluminum's Invasion of Electrical, Plumbing, Air Conditioning Fields. Kenneth V. Lutz. *Modern Metals,* v. 12, Apr. 1956, p. 52-54.

Properties, available forms, applications of aluminum solders. Photographs, tables. (K7, Al)

268-K. Joining Tubes to Tube Sheets for Corrosive Radioactive Chemical Service. W. R. Smith. *Welding Journal,* v. 35, Apr. 1956, p. 307-310.

Suitable joint designs developed for welding tube to tube sheets of heat exchangers where no maintenance repairs can be effected. Diagrams, photographs, tables. (K1, SS)

269-K. How to Use Steel Effectively in Machinery. Omer Blodgett. *Welding Journal,* v. 35, Apr. 1956, p. 311-318.

Welded design makes it possible for the designer to use the right material, in the right amount, in the right place. Photographs, graphs, tables, diagrams. (K1, T general, ST)

270-K. Inert-Arc Consumable-Electrode Welding for Automobile Rear-Axle Housings. E. G. Lommel. *Welding Journal,* v. 35, Apr. 1956, p. 319-325.

Gas metal-arc process was found to be a very satisfactory mass-production tool for carbon steel welding in the automotive industry. Photographs, diagrams. (K1, T21, CN)

271-K. Moisture and Its Effects in Carbon Dioxide Welding of Steel. R. W. Tuthill. *Welding Journal,* v. 35, Apr. 1956, p. 330-333.

Moisture in carbon dioxide has an adverse effect on the ductility of the weld metal. The yield and ultimate strength appears to be unaffected by moisture in the gas, and the increase in spatter can be kept to a minimum by using dry gas. Photographs, tables, radiograph. 4 ref. (K1, Q23, ST)

272-K. Gas-Shielded Consumable-Electrode Welding of 4130 Steel. C. R. Sibley. *Welding Journal,* v. 35, Apr. 1956, p. 334-340.

Standard AISI low-alloy electrode analyses with controlled phosphorus and sulfur contents were found to provide hardenability characteristics in the weld metal similar to those of low-alloy base metal. Photographs, tables, diagram, graphs, micrographs. 5 ref. (K1, T26, AY)

273-K. Properties and Applications of Low-Hydrogen Iron-Powder Electrodes. D. C. Smith, W. G. Rinehart and D. C. Helton. *Welding Journal,* v. 35, Apr. 1956, p. 341-347.

Low-hydrogen electrodes with iron-powder additions to the coatings have been successfully designed for good quality and operation and are commercially available in both titania and lime-type coatings. Photographs, tables, graphs. 4 ref. (K1, Fe)

274-K. Welding Aluminum to Copper Using Inert-Gas Metal-Arc Process. L. A. Cook and M. F. Stavish. *Welding Journal,* v. 35, Apr. 1956, p. 348-355.

Increasing use of aluminum busbar for elevated temperature service in combination with existing copper bus systems has led to the development of this method for braze welding aluminum to copper. Photographs, micrographs, diagrams, graphs, tables. (K1, Al, Cu)

275-K. The Arc Welding of 2.25% Cr-1.0% Mo Alloy Steel Pipe. Jay Bland. *Welding Journal,* v. 35, Apr. 1956, p. 181S-194S.

Investigation shows extent to which thermal treatments are required to obtain satisfactory properties in welded pipe. Tables, graphs, photographs. 7 ref. (K1, AY)

276-K. Inert Shielding Gases for Welding Aluminum. J. D. Dowd. *Welding Journal,* v. 35, Apr. 1956, p. 207S-210S.

Shielding gas containing 50-65% helium, balance argon, found to be superior to argon, helium or other mixtures of argon and helium for both tungsten-arc and consumable-electrode welding of aluminum. Micrographs, graphs. 9 ref. (K1, Al)

277-K. Mechanical Properties of Butt Joints Brazed With BAg-1, BAg-3 and BCu Filler Metals. G. Hansel. *Welding Journal,* v. 35, Apr. 1956, p. 211S-216S.

The room temperature, impact, tensile and fatigue properties of brazed butt joints presented in a manner that will enable proper design of these joints for specific applications. Table, diagrams, graphs, photographs, micrographs, radiographs. 1 ref. (K8, Q7, Q6, Q27)

278-K. CO_2 Inert-Arc Welding Shows Big Cost Advantage. Herb Robinson and Jim McKinney. *Western Metals,* v. 14, Apr. 1956, p. 74-75.

Advantages, procedure, cost factors. Graph, photographs. (K1)

279-K. (Japanese.) **Statistical Study on the Ilmenite Type Arc Welding Electrodes for Mild Steel (Report I). Statistics of Tensile Test Values.** Seiichi Ando and Saburo Mori. *Journal of Railway Engineering Research, (Japan),* v. 13, no. 4, Feb. 25, 1956, p. 93-100.

Analysis of statistical results on tensile strength, yield point, yield ratio, elongation and reduction of area. Graphs, diagrams, tables. 9 ref. (K1, Q27, CN)

280-K. Oxy-Acetylene and Oxy-Propane, a Comparison. II. J. Okladek. *Canadian Metals,* v. 19, Apr. 1956, p. 25-26.

Comparison of heating properties. The amount of heat transferred is calculated. Photograph, table. 2 ref. (K2)

281-K. Use of Standard Positioning Units Can Lower Welding Costs. W. W. Wakefield. *Industry & Welding,* v. 29, May 1956, p. 84-87, 90-92.

By combining two or three standard units and adding a minimum amount of simple tooling, many jobs can be handled with maximum ease and economy. Photographs. (K1)

282-K. Welding Job Made Easier With Dual-Gas Setup. F. K. Mack. *Iron Age,* v. 177, May 3, 1956, p. 104-105.

Argon and carbon dioxide were used on welding practice bombs. Outcome is faster welding, better quality and economy. Photographs. (K1)

283-K. Get Results From the New Iron-Powder Coated Electrodes. Donald B. Howard. *Power,* v. 100, May 1956, p. 80-82, 222.

Complete penetration, low porosity and predetermined ductility level are proved by laboratory tests. Techniques for production or maintenance welding outlined. Tables, graphs. (K1)

284-K. Dip Brazing Boosts Output of Aluminum Assemblies. Donald E.

Wernz. *Tool Engineer,* v. 36, May, 1956, p. 83-87.

Details of new applications of this process at the Glenn L. Martin Co. plant, including design, equipment and maintenance. Photographs. (K8, Al)

285-K. Filler Metals for Joining. Orville T. Barnett. *Welding Engineer,* v. 41, May, 1956, p. 46-48.

Development of the E6015 electrode and the E6016 low-hydrogen type. Photograph, tables. 2 ref. (K1)

286-K. Moisture in CO_2 Gas: Its Affect on Mig Welds. R. W. Tuthill. *Welding Engineer,* v. 41, May, 1956, p. 50, 52.

Tests indicate that carbon-dioxide shielded welds can fall below production standards if there is heavy moisture content in carbon dioxide gas. Photographs. (K1)

287-K. Spot Welds Under Stress. John F. Rudy, R. B. McCauley and R. S. Green. *Welding Engineer,* v. 41, May, 1956, p. 91-92.

Indicates a relationship between weld strength and three other parameters: system of failure, macrogeometry of weld cross-section, and observations of a cutaway weld cross-section under stress. Diagram, graph. photograph. (K3)

288-K. How to Weld Gas-Turbine Alloys. A. L. Cooper and H. L. Printz. *American Machinist,* v. 100, May 7, 1956, p. 121-126.

Stainless steels and superalloys for aviation gas turbines often produce specialized welding problems; here are materials and procedures that work. Graph, photographs, tables. (K1, T25, SS)

289-K. (French.) **Behavior of Pipes for Arc Welded Forced-Air Conduits During Bursting Tests.** E. Folkhard. *Revue de la Soudure (Brussels)* v. 12, no. 1, Jan. 1956, p. 15-27.

Tests to determine influence of materials and processes on the safety of arc-welded forced-air conduits. Diagrams, photographs, graphs, tables. (K1)

290-K. (German.) **Role of Argon in Physical and Metallurgical Processes During Arc Welding.** M. Puschner. *Metall,* v. 10, Nos. 9-10, May 1956, p. 423-427.

Process technology, phenomena in arc, surface and boundary stresses, argon with added oxygen. Table, diagrams, photographs. 3 ref. (K1)

291-K. (German.) **Welding Distortions, Especially by Deep Penetration Electrodes.** Horst Pflug. *Schweissen und Schneiden,* v. 8, no. 4, Apr. 1956, p. 115-122.

Measuring set for distortions; performance and evaluation of tests; relationship between maximum bending and location of longitudinal weld axis of symmetry; mechanisms of distortions; equation of bending axis. Tables, graphs, diagrams, photographs. 17 ref. (K1, ST)

292-K. (Russian.) **Low-Silicon Fluxes for Automatic Welding and Beading.** I. I. Frumin, D. M. Rabkin, V. V. Podgaetskii, I. K. Pokhodnia and E. I. Leinachuk. *Avtomaticheskaia Svarka,* v. 9, no. 1, Jan.-Feb. 1956, p. 3-20.

Composition and technical characteristics of low-silicon fluxes and methods of their preparation. Use of low-silicon fluxes makes it possible to vary within a wide range the silicon-to-manganese ratio in the metal of the seam. Flux composition affects the structure of the metal and the incidence of crystallization fissures. Tables, graph, diagram, photograph, micrographs. 16 ref. (K1, ST)

293-K. (Russian.) **Problems of Technology of Automatic Welding of Aluminum With Melting Electrode.** D. M. Rabkin and M. L. Zvonkov. *Avtomaticheskaia Svarka,* v. 9, no. 1, Jan.-Feb. 1956, p. 21-28.

Technology, techniques and apparatus used in semishielded arc welding of aluminum with a melting electrode. Optimum data on welding aluminum 4 to 25 mm. thick. Table, graphs, photographs, diagrams. 4 ref. (K1, Al)

294-K. (Russian.) **Laws Governing the Process of Welding Under Plastic Deformation.** L. A. Fridliand, T. A. Amfiteatroval and V. A. Petrunichev. *Avtomaticheskaia Svarka,* v. 9, no. 1, Jan.-Feb. 1956, p. 38-46.

Plastic deformation occurring in spot and butt pressure welding; mechanical properties of joints depending on temperature of the metal and on deformation. Graphs, diagrams, tables. 3 ref. (K3, Q general)

295-K. (Russian.) **Basic Laws Governing the Transfer of Fluxing Material From the Electrode to the Seam in Arc Welding and Coating of Steels.** A. A. Erokhin. *Svarochnoe Proizvodstvo,* no. 4, Mar. 1956, p. 4-9.

Main loss during the transfer of fluxing material from the electrode to the seam is due to chemical reactions, primarily to oxidation. Losses vary with additives and may

be reduced through the use of deoxidizing agents. Tables, graphs. 32 ref. (K1, ST)

296-K. (Russian.) **The Effect of Arc Length on the Mechanical Properties of Fused-On Metal in Welding With Austenite Electrodes.** V. S. Aristov and V. I. Sheiko. *Svarochnoe Proizvodstvo,* no. 4, Mar. 1956, p. 9-12.

Increasing the length of arc in welding with austenite electrodes leads to a considerable increase in nitrogen concentration in the seam metal, resulting in a change in its mechanical properties. Diagrams, tables, graphs. 2 ref. (K1, Q general, SS)

297-K. (Russian.) **The Effect of the Shape of Die on the Strength of the Spot Joint in Cold Welding of Aluminum.** K. K. Khrenov and G. P. Sakhatskii. *Svarochnoe Proizvodstvo,* no. 4, Mar. 1956, p. 12-14.

Experimental data on the strength of spot joints cold welded with dies of various shapes; advantages of cold welding over riveting. Diagrams, tables, photographs. 2 ref. (K5, Al)

298-K. (Russian.) **Properties of Welded and Soldered Joints in KhN78T Alloy.** V. A. Gorokhov. *Svarochnoe Proizvodstvo,* no. 4, Mar. 1956, p. 17-18.

Alloys with additional molybdenum, aluminum and columbium components can be arc-welded or soldered with heat resistant solder but not gas-welded due to reduction of strength of the material near the seam because of heating. Micrographs, table, graphs. (K1, K7)

299-K. (Russian.) **Spot Welding of Contacts in Starting and Control Devices.** B. M. Nekrasov and I. M. Radashkovich. *Svarochnoe Proizvodstvo,* no. 4, Mar. 1956, p. 18-22.

Welding of silver and powdered metal contacts calls for the use of spot welding machines with precise regulation of electrode pressure (25 to 100 kg.) and high welding current. Diagrams, photograph, table, micrograph. (K3, Ag)

300-K. Hot Crack Testing of Weld Metal Deposits. J. W. Shedden. *Australasian Engineer,* Mar. 1956, p. 68-73.

Existing test methods and their limitation; a new test where a weld bead is deposited during the actual bending of the test specimen. Tables, photographs. 14 ref. (K9)

301-K. Good Control Makes Titanium Welding a Shop Tool. F. D. Seaman. *Iron Age,* v. 177, May 31, 1956, p. 64-66.

Comparison of various methods for welding and brazing titanium, weldability tests. Welding with inert gas tungsten electrode appears best joining method. Photograph, tables. (K1, K3, K9, K8, Ti)

302-K. High-Strength Adhesives for Metal Bonding. R. F. Blomquist. *Machine Design,* v. 28, May 31, 1956, p. 99-103.

An engineering review of current requirements for adhesives, bonding-process specifications and joint design. Photographs, table, diagrams. 19 ref. (K12)

303-K. New Low Cost Method for Speedier Brazing. Harold Prince. *Sheet Metal Industries,* v. 33, no. 348, Apr. 1956, p. 253-258.

Method involves integration of a whole battery of machines and operations, so eliminating processes and minimizing the roles of the remaining operations. Graph, diagrams, tables, photographs. (To be continued.) (K8)

304-K. Structure of Weld Metal Studied by Autoradiography. B. I. Bruk. *Henry Brutcher Translation No.* 3715, 11 p. (Abridged from *Svarochnoe Proizvodstvo,* no. 11, 1955, p. 8-13.) Henry Brutcher, Altadena, Calif.

Review of current Russian theories about layer formation and the nature of segregation in weld metal. Sulphur-35 is used as autoradiographic tracer. Graph, photographs, micrographs. 12 ref. (K9, M23, AY)

305-K. (French.) **The Repair of Ship Shafts by Welding.** *Soudage et Techniques Connexes,* v. 10, nos. 3-4, Mar.-Apr. 1956, p. 60-64.

Repair of soft or semihard forged, cylindrical ship shafts in the case of a tail-shaft bracket corroded under the sleeve or near the propeller, a counter-shaft having a metal defect, and a counter-shaft to correct a mistake in machining. Photographs. 1 ref. (K1, ST)

306-K. (French.) **French Developments in Argon Welding With a Fusible Electrode.** L. Dumoulin. *Soudage et Techniques Connexes,* v. 10, nos. 3-4, Mar.-Apr. 1956, p. 87-97; disc., p. 97-98.

Possibilities offered by argon welding for aluminum and copper and their alloys, stainless steels, and soft steels; absence of solid flux, high rate of deposition, semi-automatic process, visibility of arc, and high-quality welds. Photographs. (K1, ST, Al, Cu, SS)

307-K. The Effect of Surface Treatment on the Properties of Adhesive-Bonded Joints in Metals. J. A. Edwards. *Sheet Metal Industries,* v. 33, no. 349, May 1956, p. 311-314, 322.

Adsorbed film and adhesion, metal thickness, surface treatments for stainless steel, magnesium and titanium, and magnesium joints. Graph, tables. (K12, SS, Mg, Ti)

308-K. A Straight-Polarity, Inert-Gas Process for Welding Mild Steel. J. M. Cameron and A. J. Baeslack. *Welding Journal,* v. 35, May 1956, p. 445-449.

Process is made possible by addition of metallic-oxide coating to surface of electrode, and is characterized by high metal deposition rates, good penetration and good arc stability. Macrographs, graphs, tables, diagrams, photographs. 1 ref. (K1, ST)

309-K. Resistance Welding Ductile Joints in Commercially Pure Titanium. R. Wickham. *Welding Journal,* v. 35, May 1956, p. 463-467.

High-ductility resistance welds can be produced provided all welding variables are closely controlled. Tables, photographs. (K3, Ti)

310-K. Thermal Efficiency in Arc Welding. J. ter Berg and A. Larigaldie. *Welding Journal,* v. 35, May 1956, p. 252S-254S.

Using a special calorimeter, the different energies which play a role during arc welding were determined separately. Table, diagram. 7 ref. (K1)

311-K. Effect of Irradiation on Weldability of ASTM A212, Grade B. Wendell R. Hutchinson. *Westinghouse Electric Corporation, Bettis Plant (U. S. Atomic Energy Commission),* WAPD-153, Feb. 1956, 32 p.

The only factor observed which might influence the quality of a weld on irradiated material was the encumbrance of the welder with additional clothing and safety procedures and the resultant psychological effects on the quality of his work. Diagrams, tables. 25 ref. (K9, A7, AY)

312-K. (Czech.) **Aluminum and Copper Cold Pressure Butt-Welding.** Jiri Hoskovec and Vaclav Pilous. *Zvaranie,* v. 4, no. 12, Dec. 1956, p. 357-365.

Theories of mechanism of union in cold pressure welding. Role of deformation and cleaning of surfaces. Welding aluminum with aluminum, aluminum with copper, copper with iron, and other combinations. Strength, fatigue, hardness and corrosion tests. Electrical resistance of weld. Photographs, diagrams, tables, graphs, micrographs. 6 ref. (K5, Q general, R general, Al, Cu)

313-K. (German.) **Effect of Welding Methods on Design.** K. Bobek. *Schweissen und Schneiden,* v. 8, no. 5, May 1956, p. 152-158.

Suggestions for selection of welding method for various metals and construction types. Tables, diagrams, photographs. (K general)

314-K. (German.) **Induction-Welding of Pipes in Construction of Boilers and Apparatuses.** O. Niezoldi, E. Jöllenbeck and W. Stenger. *VDI Zeitschrift,* v. 98, no. 14, May 1956, p. 818-823.

Principles and process of induction welding, properties of joints thus welded. Photographs, tables, diagrams, micrographs. 9 ref. (K6)

315-K. (Italian.) **Technology of Brazing and Soldering.** Mario Macuz. *Tecnica Italiana,* v. 21, no. 2, Mar. 1956, p. 73-84.

Processes are defined and physical and chemical phenomena taking place in the formation of joints illustrated. Diagrams, photographs. 17 ref. (K8, K7)

316-K. (Russian.) **Temperature Distribution in the Bath During Automatic Welding of Aluminum.** D. M. Rabkin. *Avtomaticheskaia Svarka,* v. 9, no. 2, Mar.-Apr. 1956, p. 1-11.

Determined with submerged thermocouples. Influence of welding rate, voltage and temperature of basic metal on distribution of temperature in the bath. Diagrams, photographs, graphs, tables. 4 ref. (K1, Al)

317-K. (Russian.) **The 13Kh3GNMA Welding Rod for Automatic Welding of 30KhGSA Steel.** T. M. Slutskaia. *Avtomaticheskaia Svarka,* v. 9, no. 2, Mar.-Apr. 1956, p. 12-17.

An alloy for automatic welding which provides a uniformly strong weld in steel. The thermally treated joint is crackproof and can attain a yield strength of 110 to 120 kg. per sq. mm. Tables, diagram, photograph, micrograph. 4 ref. (K1, ST)

318-K. (Russian.) **Influence of the Welding Method on the Joint Area in Commercial Titanium.** S. M. Gurevich. *Avtomaticheskaia Svarka,* v. 9, no. 2, Mar.-Apr. 1956, p. 18-21.

The influence of linear energy of welding on the structure of the overheated portion of the joint area in commercial titanium. Graph, micrograph. 4 ref. (K1, Ti)

319-K. (Russian.) **Automatic Butt Welding of Stainless Steel Pipes.** N. Iu. Pal'chuk and A. I. Akulov. *Avtomaticheskaia Svarka,* v. 9, no. 2, Mar.-Apr. 1956, p. 27-34.

The technology and techniques of argon-shielded arc welding of pipe from 57 to 89 mm. diam. Welded joints possess good mechanical properties and a high corrosion resistance. Diagrams, tables, photographs. (K1, SS)

320-K. (Russian.) **Study and Application of Automatic Arc Beading of Parts With an Oscillating Electrode.** I. R. Patskevich and G. D. Kulikov. *Svarochnoe Proizvodstvo,* no. 5, May 1956, p. 6-12.

Compares a previously suggested allegedly "resistance beading" method employing oscillating electrodes with a newly proposed method of arc beading with the aid of an oscillating electrode; discusses its advantages. Tables, diagrams, graphs, photographs. 3 ref. (K3, K1)

321-K. (Russian.) **Automatization of the Guidance of the Welding Head Along the Butt.** I. L. Brinberg and P. G. Rybalko. *Svarochnoe Proizvodstvo,* no. 5, May 1956, p. 12-17.

A tracing system for automatic regulation of the motion of the welding head along spiral butts, securing a welding rate up to 200 m. per hr. Diagrams, photographs. 12 ref. (K1)

322-K. (Russian.) **The Removal of Oxide Inclusions From the Contact Area in Resistance Flash Welding.** A. S. Gel'man. *Svarochnoe Proizvodstvo,* no. 5, May 1956, p. 17-19.

Removal of oxides from the contact area requires that, at the moment of upsetting, the edges be covered with molten metal throughout the whole area of contact; other details. Diagram, micrograph, table, graphs. 3 ref. (K3, ST)

323-K. (Russian.) **Technology of Arc Welding Thin Sheet Steels in a Carbon Dioxide Medium.** F. E. Tret'iakov, A. B. Karan, and S. N. Valeev. *Svarochnoe Proizvodstvo,* no. 5, May 1956, p. 20-22.

Discusses experimental CO_2-shielded automatic and manual arc welding of stainless and low-alloy steel sheets 1 to 2.5 mm. thick. Substitution of carbon dioxide for argon makes shielded arc welding 8 to 10 times cheaper. Photographs, tables, diagrams, graphs. (K1, AY, SS)

324-K. (Spanish.) **Electric Arc Welding. III.** *Ciencia y Técnica de la Soldadura,* v. 6, no. 29, Mar.-Apr. 1956, 12 pages.

Fundamentals and present developments in electric arc welding in Germany, Switzerland, France, Belgium, England, Italy, the United States and Spain. Diagrams, graph. (K1)

325-K. (Spanish.) **New Developments in the Electric Resistance Welding of Light Alloys.** G. Moressée. *Ciencia y Técnica de la Soldadura,* v. 6, no. 29, Mar.-Apr. 1956, 22 p.

Processes and equipment; applications of method in aeronautical, railroad and automobile industries; special materials and their applications in these industries. Graphs, tables, diagrams, photographs. (K3, EG-a)

326-K. (Book.) **Handbook of Fastening and Joining of Metal Parts.** Vallory H. Laughner and Augustus D. Hargan. 622 p. 1956. McGraw-Hill Book Co., 330 W. 42 St., New York, 36, N. Y. $15.00

The objective of this book is to provide the design engineer with both a reference and an idea source covering all known methods of joining metal parts including fitted fastenings, welds and adhesive joining. (K general)

327-K. Welding of Thick Plates of Bureau of Mines Zirconium. D. C. Martin, R. D. Williams and C. B. Voldrich. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* AECD-3863, July 1950, 42 p.

The inert-gas-shielded tungsten-arc process for welding zirconium, using helium as the shielding gas, was satisfactory. Welding had to be done in a controlled atmosphere chamber to prevent high weld hardnesses, and crystal-bar filler metal had to be used. Photographs, micrographs, graphs, diagrams, tables. (K1, Zr)

328-K. Furnace Brazing of Titanium. L. D. Girton. *Convair, Report No.* 7957 Add. 1, Mar. 1954, 4 p.

Strength, ductility and corrosion resistance of lap joints in 0.025 RC70 titanium, furnace brazed with fine silver. Table, diagrams. (K8, Ti)

329-K. Which Welding Process? G. F. W. Barrett. *Industry & Welding,* v. 29, June 1956, p. 58 + 6 pages.

Cost of joint preparation, direct labor costs and general overhead charges for various arc processes and oxy-acetylene welding. Tables. (K1, K2)

330-K. Resistance Welding High Temperature Alloys. P. M. Howard and D. Wilcox. *Industry & Welding,* v. 29, June 1956, p. 66 + 5 pages.

Conditions for welding, importance of proper cooling during stitch welding, welding dissimilar materials and production quality control. Photographs. (K3, SG-h)

331-K. Weld Aluminum Two Ways in Mass Production Setup. L. W. Kunkler. *Iron Age,* v. 177, June 7, 1956, p. 122-123.

Mass production of 13-ft. long aluminum fire bombs depends on a lineup of 20 manual and semi-automatic welding stations, using gas-shielded tungsten and metal arc methods. Photographs. (K1, Al)

332-K. Braze Strong Joints With Self-Fluxing Alloys. D. A. Canonico, Nicholas Bredzs and Harold Schwartzbart. *Iron Age,* v. 177, June 14, 1956, p. 98-99.

New lithium-bearing alloys join metals like stainless, nickel and cobalt-base alloys without use of reducing atmosphere. Joint strength is high, without voids or tendency to corrode. Photographs. (K8, SS, Ni, Co)

333-K. Welding Clad Steel. William H. Funk. *Iron and Steel Engineer,* v. 33, May 1956, p. 104-107.

Quality workmanship in fabrication pays off in economical vessels and weldments which meet their design requirements. Principles and procedures for welding. Diagrams, photographs. (K1, K2, ST)

334-K. Inert Atmosphere Welding of Zirconium and Hafnium. J. S. Theilacker, E. D. Baugh, A. H. Kasberg and R. B. Stermon. *Journal of Metals,* v. 8, May 1956, p. 646-647.

Low thermal expansivity and very small volume change associated with phase transformations permit welding of complex structures with minimum of distortion. Equipment and procedures. Diagram, photograph. (K1, Zr, Hf)

335-K. Designing for Soldered Joints. J. B. Mohler. *Machine Design,* v. 28, June 14, 1956, p. 123-128.

Basic design and application considerations, alloy and fluxes, requirements of the soldering process, joint strength and solderability of metals. Diagrams, graphs, tables. (K7)

336-K. The Welding of Titanium. R. Fannon. *Welding and Metal Fabrication,* v. 24, June 1956, p. 192-193.

The inert-gas arc welding processes, argon-arc and Argonaut, are eminently suited to the fusion welding of titanium. Photographs, diagram, table. (K1, Ti)

337-K. Welding Shows Adaptability in Rocket Fabrication. Francis H. Stevenson. *Welding Engineer,* v. 41, June 1956, p. 32-34.

Techniques used on titanium and stainless steel; fixture design. Photographs. (K1, SS, Ti)

338-K. Uses Expand as 200-Series Stainless Passes Weldability Tests. *Welding Engineer,* v. 41, June 1956, p. 40-42, 44.

Physical properties, weldability tests, welding conditions, production outlook. Photographs, tables. (K9, Q23, SS)

339-K. (German.) Shielded Arc Welding of Light Metals. W. Mantel and L. Wolff. *Aluminium,* v. 36, no. 6, June 1956, p. 327-332.

Composition of shielding gas, physical properties and anodizability of welds, applications. Photographs, diagrams, table. (K1, Al)

340-K. The Influence of Welding in the Power and Process Industries. H. Harris. *British Welding Journal,* v. 3, June 1956, p. 233-241.

Welding in boiler construction, fabrication of valves, nuclear reactors, chemical engineering and oil industry applications. (K general)

341-K. Cold-Driven and Hot-Driven Titanium Rivets. *Convair, Report No.* 9536, May 1956, 17 p.

Mechanical properties of lap joints with cold and hot commercially pure titanium rivets. Fatigue life of sheet material into which they are driven. (K13, Q7 T7, Ti)

342-K. Fastening Devices for Sheet Metal. *Light Metals,* v. 19, June 1956, p. 183-184.

Drive rivets, rivnuts, Hishear rivets, Chobert rivets, break-off screw, self-sealing dome nut, Lamson place bolt, locking inserts. Diagrams. (K13)

343-K. Simple Soldering. *Modern Metals,* v. 12, June 1956, p. 64, 66.

Process joins aluminum, titanium, tantalum, stainless steel, glass, ceramics and other "unsolderable" materials without use of flux, surface cleaning or other pretreatment. (K7, SS, Ta, Ti, Al)

344-K. Brazing With Silver Alloys. *Steel,* v. 138, June 25, 1956, p. 80-83.

Composition, brazing temperatures, properties and uses of standard and special silver brazing alloys. (To be continued.) (K8, Ag, Cu, Zn)

345-K. The Why of Flux. A. M. Setapen and E. S. Chamer. *Steel,* v. 139, July 2, 1956, p. 80-82, 85.

Function, properties and composition of general-purpose flux for sil-

ver alloy brazing; properties of special fluxes. (K8, Ag)

346-K. Wrought Stainless-Steel Forms and Weldability. *Welding Engineer,* v. 41, June 1956, p. 62

Tabulated data on 25 stainless steels. (K9, S22, SS)

347-K. A Selection Guide for Methods of Submerged-Arc Welding. Robert A. Wilson. *Welding Journal,* v. 35, June 1956, p. 549-555.

Process selection, types of current, multiple arcs, type of control, power sources, special applications. (K1)

348-K. Mild-Steel Electrodes for Gas Metal-Arc Welding in Carbon Dioxide. Julian D. Carey and Robert D. Mann. *Welding Journal,* v. 35, June 1956, p. 556-559.

Killed and semikilled steel produce higher quality welds than rimmed steel using both carbon dioxide and argon-oxygen gases. (K1, ST)

349-K. How to Reclaim Plant and Machinery by Practical Welding Applications. G. Gordon Musted. *Welding Journal,* v. 35, June 1956, p. 560-567.

Oxy-acetylene, metal-arc and carbon-arc welding processes used to make many of the difficult repairs required by typical maintenance and reclamation applications. (K1, K2, ST)

350-K. Welding of Titanium. E. F. Gorman. *Welding Journal,* v. 35, June 1956, p. 575-580.

Techniques employed in the application of the inert-gas tungsten-arc process to the welding of titanium outside of atmosphere-controlled chambers. A practical test criterion for evaluating weld results. (K1, Ti)

351-K. Electrical and Metallurgical Characteristics of Mash Seam Welds. E. J. Funk and M. L. Begeman. *Welding Journal,* v. 35, June 1956, p. 265S-274S.

Relationship between mash seam welding variables and resultant characteristics of the weld. (K3)

352-K. High-Speed Fastener Production. Charles Palmer. *Western Machinery and Steel World,* v. 47, June 1956, p. 81-82.

A highly automatized and extremely self-sufficient production setup for fasteners that meet exacting standards of the aircraft industry. (K13)

353-K. (Czech.) Flash-Resistance Butt Welding of Heat Resistant Steels and Carbon Steel. O. Hajzler. *Strojirenstvi,* v. 6, no. 1, Jan. 1956, p. 36-39.

Properties of heat resistant steels. Mechanical and metallographic tests of a weld of a heat resistant with a carbon steel, and of two heat resistant steels. Economic advantages. (K3, Q general, M general, SS-h, CN)

354-K. (Czech.) Welding of Anticorrosive, Columbium-Stabilized Steels for Use in Steam Turbines at 600° C. Josef Nemec. *Zvaranie,* v. 5, no. 1, Jan. 5, 1956, p. 18-21.

Effect of initial ferrite content and various heat treatments on brittleness and notch toughness of welded metal. Causes, nature and prevention of internal stresses and cracking. (K1, J general, Q23, Q25, AY)

355-K. (Czech.) Increasing Production by Argon-Shielded Welding. Zdenek Bajer. *Zvaranie,* v. 5, no. 1, Jan. 5, 1956, p. 21-24.

Preparation of surfaces, polishing, preheating, current strength and welding time, types of electrodes, position of surfaces to be joined. (K1, Cu, Al)

356-K. (Czech.) Concise Information About Several New Apparatuses for Submerged Arc Welding. Jaromir Lukasek. *Zvaranie,* v. 5, no. 2, Feb. 2, 1956, p. 36-39.

Devices and machines for flux welding pipes to boilers. Manner of operation and types of motors used. Carbon-arc welding machine. (K1, ST, CN)

357-K. (Russian.) Welding of Fine Thermocouples by Short Current Impulses. A. G. Anikin. *Zhurnal Fizicheskoi Khimii,* v. 30, no. 3, Mar. 1956, p. 685-687.

Method for producing fine thermocouples without the inclusion of a third metal, as in the case of soldering, and with almost no widening at the junction. (K3, S16)

358-K. (Slovak.) Epoxyde Resins as Metal Bonds. Alfred Herman. *Zvaranie,* v. 5, no. 2, Feb. 2, 1956, p. 40-45.

Successful development of synthetic resins for bonding meant discarding costly pressure equipment and simplification of joining technology. (K12)

359-K. (Slovak.) Deformations Arising in Welding and Methods of Preventing Them. Ladislav Elias. *Zvaranie,* v. 5, no. 2, Feb. 2, 1956, p. 48-53.

Proper welding techniques, such as welding time, preparation of parts, position relation of parts to be joined, temperature control and choice of electrodes, for avoiding thermal deformations and internal stresses. (K general, Q25, ST, CN)

360-K. Carbon Dioxide for Welding. I. Allen F. Knight. *Canadian Metals,* v. 19, June 1956, p. 22, 24.

New methods of control and application put carbon dioxide ahead for use as inert gas. (To be continued.) (K1)

361-K. Fabrication of a Welded Steel Crankcase for a Large, 2-Cycle Diesel or Natural Gas Engine. Leo L. Young. *General Motors Engineering Journal,* v. 3, July-Sept. 1956, p. 22-27.

Submerged-arc welding techniques for a 9-ft. long, light-weight crankcase. (K1, AY)

362-K. Planned Welding Techniques Produce Quality Products. Dave Ritchie. *Industry & Welding,* v. 29, July, 1956, p. 52-54, 74-75.

Equipment and methods for resistance welding of copper sheet. (K3, Cu)

363-K. A Study on Low Temperature Brazing. II. Wetting by Droplet Method and Brazing Strength. Hitoshi Ishida and Shiro Yaji. *Journal of Mechanical Laboratory (Japan),* v. 1, 1955, p. 29-30.

The brazing droplet with greater wettability accelerates the alloying between solder and base metal, and consequently shows the higher brazing strength in a wider range of joint clearance. (K8)

364-K. Tips on Aluminum Joining. Frank Romano. *Light Metal Age,* v. 14, June 1956, p. 22-24.

Problems pertaining to heat conductivity and lack of heat color, use of fluxes, torch joining, joining thick sections. (K2, Al)

365-K. Fluxing Techniques. A. M. Setapen and E. S. Chamer. *Steel,* v. 139, July 9, 1956, p. 99-100.

Various brazing techniques applicable to pieces of different sizes and shapes on a production basis. (K8)

366-K. The Welding of a Small-Diameter, High-Pressure Gas Main. W. R. Garrett. *Welder,* v. 25, Jan.-Mar. 1956, p. 2-4.

Arc welding equipment and procedures. Economic factors. (K1, ST)

367-K. Soldered Stainless Resists Acid Corrosion. Herbert Drapkin. *Welding Engineer,* v. 41, July 1956, p. 29.

New stainless silver alloy has a melting point below 450° F. and can be applied with a soldering iron. (K7, R5, Ag, SS)

368-K. In Japan—Weldors Erect New T-1 Steel Vessels. Jack Fairlie. *Welding Engineer,* v. 41, July, 1956, p. 30-31.

Two 110-ft. diam. vessels with an operating pressure of 71 psi. were built, using a high-strength, low-alloy steel, with a minimum yield of 90,000 psi. and good weldability. (K1, K9, T29, AY)

369-K. Welding. . .for Sanitary Seals of Stainless. F. T. Tancula. *Welding Engineer,* v. 41, July 1956, p. 32-34.

Welding techniques applied to fabrication of dairy and food-processing equipment. (K1, SS)

370-K. Points to Remember When Soldering Copper Tube. Arthur I. Heim. *Welding Engineer,* v. 41, July 1956. p. 37-39.

Solder selection, flux requirements, preparing the work, judging proper heat, testing soldered joints. (K7, Cu)

371-K. Proper Tooling Creates Savings on Inert Gas in Titanium Welding. *Welding Engineer,* v. 41, July 1956, p. 40-41.

"Chill-shunt" tooling method produces bright welds with no sign of oxidation, without the use of inert gas backing. (K1, Ti)

372-K. Aluminum-Wound Step Regulators Can be Tig Welded. C. W. Nielsen. *Welding Engineer,* v. 41, July 1956, p. 75-76.

High-frequency tungsten inert-gas welding, with helium as a shield, provides an excellent electrical and mechanical connection between aluminum parts. Use of helium as shielding gas prevents oxidation. (K1, Al)

373-K. (French.) **"Riv-Clé"-Rivets and the Joining of Sheets Accessible Only on One Side. II. Rivet Guns.** B. Adaridi. *Revue de l'Aluminium,* v. 33, no. 231, Apr. 1956, p. 403-407.

Types of simple manual apparatus and semi-automatic air and oil-driven tools for positioning small or large rivets. (K13, Al)

374-K. (Italian.) **Technology of Soldering and Brazing. Filler Materials and Fluxes.** Mario Macuz. *Tecnica Italiana,* v. 21, no. 3, Apr.-May 1956, p. 165-171.

Scientific and technological aspects of the two processes. (K7, K8)

375-K. (Russian.) **New High-Conductivity Copper Alloys for Resistance Welding Electrodes.** M. V. Zakharov. *Metallovedenie i Obrabotka Metallov,* 1956, no. 5, May 1956, p. 2-11.

Influence of various additives on the electric conductivity and heat resistance of copper. Composition, properties and uses of certain new copper alloys employed in resistance welding. (K3, P15, Cu)

376-K. (Book.) **Proceedings of the Conference on Welded Structures.** 315 p. 1954. Her Majesty's Stationery Office, London, England. $7.20.

Stress analysis, design and welding procedures for ships, buildings, dock gates, caissens, bridges, oil and gas storage vessels and tubular structures. (K1, Q25, ST)

377-K. Carbon Dioxide Slashed Our Welding Costs. R. J. Keller and J. P. Koss. *American Machinist,* v. 100, July 16, 1956, p. 118-120.

Production testing gives comparative costs on identical jobs shielded with argon, helium and carbon dioxide. (K1)

378-K. How to Avoid Cracks in Welding Stabilized Stainless. W. L. Fleischmann. *Iron Age,* v. 178, July 12, 1956, p. 76-78.

An explanation of zone cracking and tips for preventing cracks. Photographs. (K1, Q26, SS)

379-K. Joining Stampings: Which Method Is Best for You? Federico Strasser. *Iron Age,* v. 178, July 12, 1956, p. 80-83.

Factors influencing choice of joining method, tips on riveting, brazing, welding and other techniques. (K general)

380-K. Automatic Setup Welds Structural Steel Fast. C. W. Sherman. *Iron Age,* v. 178, July 19, 1956, p. 116-117.

Fabricating building columns from structural steel took 45 hr. by hand, versus 8 hr. on automatic equipment. Technique found practical on wide-flange sections up to 60 ft. long at speeds of 20 in. per min. (K1, T26, ST)

381-K. No-Heat Adhesives Simplify Joining Problems. *Iron Age,* v. 178, July 19, 1956, p. 118-119.

Latest epoxy-based formulations cure without heat, offer high-strength, simple-to-make, trouble-free joints. Application to power switching equipment was very successful. (K12)

382-K. Selection of Stainless Steel Electrodes for Trouble-Free Welds. R. David Thomas, Jr., *Metal Progress,* v. 70, July 1956, p. 73-76.

Welding cracks in Type-347 can be eliminated by using an electrode which will produce a weld containing a small amount of ferrite. (K1, SS)

383-K. The Welding of Zirconium. E. C. Rollason and B. S. Hockenhull. *Welding and Metal Fabrication,* v. 24, July 1956, p. 230-234.

Argon-arc welding and its influence on mechanical and corrosion properties. (K1, Q general, R general, Zr)

384-K. Aluminium Fabrication in Boat Building. R. C. Du Cane. *Welding and Metal Fabrication,* v. 24, July 1956, p. 235-240.

Design and construction of a 68 ft. all-welded aluminum boat, using self-adjusting arc welding equipment. (K1, T22, Al)

385-K. Fortiweld, a New Development in Weldable High-Tensile Steel. III. H. F. Tremlett. *Welding and Metal Fabrication,* v. 24, July 1956, p. 250-252.

Satisfactory mechanical tests on butt welds in 1-in. thick Fortiweld plate, welded by the Unionmelt process, indicate that welding wire to Grade 3 and powder to Grade 80 are desirable. (K1, Q general, ST)

386-K. Root Passes in Stainless Steel With New Inert-Arc Procedures. E. B. Lavelle, L. H. Rasmussen and E. M. Kuchera. *Welding Journal,* v. 35, July 1956, p. 647-654.

The joint closure method described makes it possible to obtain satisfactory uniformity of inner weld surface with comparative ease. (K1, SS)

387-K. Power Supplies for Gas-Shielded Metal-Arc Welding. A. Lesnewich and E. Cushman. *Welding Journal,* v. 35, July 1956, p. 655-664.

The constant-voltage transformer-rectifier with automatic regulation for fluctuations in line voltage is the best general-purpose power source. (K1)

388-K. Physical Properties of Commercial Silver-Copper-Phosphorus Brazing Alloys. Karl M. Weigert. *Welding Journal,* v. 35, July 1956, p 672-674.

Alloys are self-fluxing and used especially in places where fluxes cannot be removed after the brazing operation, but are only recommended for joining nonferrous metals, since iron phosphide formation embrittles the joints. (K8, SG-f)

389-K. Pressure Welding by Heating With High-Speed Electrodes. Mellon O. Washburn. *Welding Journal,* v. 35, July 1956, p. 675-678.

Laboratory tests indicate that new process is capable of butt welding tubular sections of various diameters and wall thicknesses with a number of advantages over other processes. (K6)

390-K. A Systems Analysis Approach to Aircraft Spot-Weld Reliability. J. M. Peterson and E. R. Funk. *Welding Journal,* v. 35, July 1956, p. 679-683.

New approach to the problem of spot-weld reliability seems to hold the best promise for advancing the usage of spot welding in the aircraft and other quality-conscious industries. (K3)

391-K. Chocolate Molds Repaired With Nickel-Steel Solder. Herbert Drapkin. *Welding Journal,* v. 35, July 1956, p. 684-685.

New solder means longer production life and reduced cavity breakage. (K7, SG-f)

392-K. Effect of Moisture in the Coatings of Low-Hydrogen Iron-Powder Electrodes. D. C. Smith, W. G. Rinehart and K. P. Johannes. *Welding Journal,* v. 35, July 1956, p. 313S-322S.

Porosity and cracking in weld metal and fusion zone is the principal detrimental effect of moisture. (K1, Fe)

393-K. Evaluation of Weld-Cracking Tests on Armor Steel. S. Wiss, J. N. Ramsey and H. Udin. *Welding Journal,* v. 35, July 1956, p. 348S-356S.

Different heats of alloy armor plate were studied by means of cruciform, controlled thermal severity, and multiple bead-on-plate weld-cracking susceptibility tests. (K9, AY)

394-K. (Czech.) **Mechanization and Automation in Electric Resistance Butt Welding.** A. Matousek. *Strojirenska vyroba,* v. 4, no. 4, Apr. 1956, p. 164-166.

Description of Czech automatic resistance welding machines. (K3)

395-K. (Czech.) **Some Interesting Applications of Resistance Flash-Welding.** Jiri Böhm. *Zvaranie,* v. 5, no. 5, May 1956, p. 130-136.

Methods, equipment and adaptation for production line fabrication. Butt welding methods applied to pipes, axles, crank and drive shafts. Flash welding of aluminum automobile fenders. (K3, Al)

396-K. (Czech.) **Testing Solders.** Viliam Ruza. *Zvaranie,* v. 5, no. 5, May 1956, p. 136-141.

Testing apparatus and procedures for evaluating and comparing the properties of various types of hard and soft solders. Performance and evaluation tests for determining ability of solder to fuse with the metals being joined, flowing properties, strength and working temperature. (K7)

397-K. (Czech.) **Mechanical Properties of Bonded Joints of Light Metals.** Vladimir Gregor. *Zvaranie,* v. 5, no. 5, May 1956, p. 141-143.

Comparison of the bonding qualities of two bonding materials, "Upon 1001 B," and "Upon 1200 P." Both adhesives resist corrosion. (K12, Q23)

398-K. (German.) **Welding Methods and Welding Machines.** H. V. Hofe. *Schweissen und Schneiden,* v. 8, no. 6, June 1956, p. 182-186.

Problems of welding research and methods and machines in use in Germany and foreign countries. (K1, K2, K3)

399-K. (German.) **Problems of Welding Design and Their Calculation.** K. H. Effertz. *Schweissen und Schneiden,* v. 8, no. 6, June 1956, p. 187-189.

Evaluation of welds in steel structures, types of steel, calculation of welds in bridge construction. (K1, K2, T25, ST)

400-K. (German.) **Material Problems of Welding.** Helmut Koch. *Schweissen und Schneiden,* v. 8, no. 6, June 1956, p. 193-203.

Effect of welding method on the weldability of metals. Physical and metallurgical processes in fusion welding, problems of fusion-welding, zonal character of fusion-welded joints. (K general)

401-K. (German.) **Investigations and Studies of Metal Joining.** K. Krause. *VDI Zeitschrift,* v. 98, no. 18, June 1956, p. 983-984.

A study of the factors affecting the strength of a joint. Includes corrosion resistance, properties of various adhesives, flexural vibration strength and relation between the tensile stress on the metal at the breaking point of the joint to the tensile strength of the metal. (K general, Q23)

402-K. (German and French.) **Component Metals in High-Frequency Soldering.** *Zeitschrift für Schweisstechnik,* v. 46, no. 6, June 1956, p. 133-139.

Physical properties, specifications and applications of component metals for high-frequency soldering. Optimum soldering temperatures. (K7)

403-K. (Hungarian.) **Results Achieved with Hungarian-Made Bonding Materials for Metals.** Maria Hollo Gyenesné. *Kohaszati Lapok,* v. 9, no. 5, May 1956, p. 235-238.

Investigation of Hungarian-developed "Polikon H1": an alkali-type polyester contact resin, its aging, chemical resistance and application. (K12)

404-K. (Russian.) **Arc Welding of Magnesium Alloys.** S. Z. Klintsov, A. A. Laptev and P. M. Liubalin. *Svarochnoe Proizvodstvo,* no. 6, June 1956, p. 17-20.

Investigates practical problems of proper electrode coatings, mechanical and corrosion tests and metallographic examination of welds and industrial testing of the procedures. (K1, Mg)

405-K. (Russian.) **Torsion Testing of Spot Welds.** B. D. Orlov and P. L. Chuloshnikov. *Svarochnoe Proizvodstvo,* no. 6, June 1956, p. 20-21.

Equipment and procedures involved and the results of spot weld tests on a number of materials. (K9, K3)

406-K. (Russian.) **Automatic Welding of Nonturnable Pipe Joints.** V. R. Verchenko, A. V. Petrov and M. I. Baranov. *Svarochnoe Proizvodstvo,* no. 6, June 1956, p. 22-26.

Compares relative advantages of butt welding of pipes with consumable and nonconsumable electrodes. Describes equipment used in welding of nonturnable pipe butts. (K1)

407-K. (Russian.) **Automatic Argon-Shielded Arc Welding With a Consumable Electrode of Stainless Steel in Various Spatial Positions.** A. I. Akulov, and N. Iu. Pal'chuk. *Svarochnoe Proizvodstvo,* 1956, no. 6, June 1956, p. 27-29.

Recently developed method of arc welding stainless steel by using currents at which molten filler metal flows in a "jet" rather than by drops. Method leads to good results regardless of position of the electrode. (K1, SS)

408-K. Practical Application of Inert-Gas Shielded Metallic Arc Welding. J. A. Lutze and J. P. Best. *Australasian Engineer,* v. 48, May 1956, p. 56-62.

Emphasis is on copper and copper alloys, particularly phosphor bronze. Aluminum, stainless steel and mild steel also considered. (K1, Cu, Al, SS, ST)

409-K. Heavy Machine-Frame Construction. Colin Spencer. *British Welding Journal,* v. 3, July 1956, p. 297-301.

The factors affecting the preparation and welding of heavy machine frames are considered in relation to the duty of the machine, and the fabrication of a number of examples is desired. (K1, ST)

410-K. Welding Composite Steels: Applied Liners. Helmut Thielsch. *Machine Design,* v. 28, July 26, 1956, p. 86-91.

Summarizes methods of welding liners to backing steel and joining the composite plates. (K1, K3, ST)

411-K. Tapes Automatically Control Big Riveter. John H. Stansbury and J. M. Brakestraw. *Metalworking Production,* v. 100, July 6, 1956, p. 1029-1031.

"Drivmatic" riveter uses punched tape but is fundamentally mechanical. It accurately positions 9 x 47-ft. wing panels so that finished riveted fastenings can be made at the rate of two a minute. (K13)

412-K. (Czech.) **Mechanization of Welding in Boilermaking Plants.** Vladimir Kvizda. *Zvaranie,* v. 5, no. 4, Apr. 1956, p. 98-104.

Design features and operation of new mobile equipment, automatic and semiautomatic, for welding longitudinal and other seams of boilers. (K1, ST)

413-K. (Dutch.) **The Sigma-Welding of Steel.** W. Gerritsen. *Smit Mededelingen,* v. 11, no. 2, June 1956, p. 39-53.

The Sigma welding of low carbon steel. Apparatus involved, mechanical properties of the weld, applications and economical possibilities. (K1, CN)

414-K. (French.) **A Contribution to the Study of the Welding of Refractory Austenitic Steels.** Joseph Hochmann. *Metaux, Corrosion-Industries,* v. 31, no. 370, June 1956, p. 265-273.

Lowering the silicon content of the electrode improves the weld, but a slight modification in the gamma and alpha-producing elements, which changes austenoferritic structure, seems to be the best solution to the problem. (K1, ST)

415-K. (German.) **Improvements in Securing Screws. I. Spring Washers and Their Increase of Efficiency.** W. Koennecke. *Forschung auf dem Gebiete des Ingenieurwesens,* v. 22, Ausgabe B, no. 3, 1956, p. 85-94.

The turning moments for tightening and loosening, the axial loads, the springiness and the security effect of screws were measured by means of new high-precision measuring devices. The data obtained were used to design an improved washer. (K13)

416-K. (German.) **About the Evaluation of the Stresses Occurring Due to Plastic Tightening of Screws on an Inclined Base.** H. Hasselgruber. *Forschung auf dem Gebiete des Ingenieurwesens,* v. 22, Ausgabe B, no. 3, 1956, p. 95-101.

The theory of ideally plastic bodies was applied to the determination of stress distributions in the cross section of the screws. (K13, Q25)

417-K. (Slovak.) **Mechanical Properties of Bonded Joints of Light Metals.** Vladimir Gregor. *Zvaranie,* v. 5, no. 4, Apr. 1956, p. 112-113.

Foreign and Czechoslovak progress in bonding light metals. Mechanical properties of two adhesives. Effect of temperature on notch toughness of these resins when solidified. Static and dynamic loading tests of bonded aluminum alloys.

(K12, Q general, Al, Mg)

418-K. Brazing and Soldering of Titanium. W. J. Lewis, G. E. Faulkner and P. J. Rieppel. *Battelle Memorial Institute, Titanium Metallurgical Laboratory Report No.* 45, June 1956, 19 p.

Summary of information in published literature and in Government research reports. Brazing and soldering procedures; properties of joints brazed with commercial and experimental filler metals. (K7, K8, Ti)

419-K. It Isn't Mud—If You Are Careful. H. F. Ried Jr. *Canadian Metals,* v. 19, July 1956, p. 18, 20, 22.

Welding electrode manufacture calls for careful process control to meet high modern welding standards. (To be continued.) (K1)

420-K. Carbon Dioxide For Welding. II. Allen F. Knight. *Canadian Metals,* v. 19, July 1956, p. 24-27.

New methods of control and application have brought carbon dioxide back to stay as an "inert" gas for welding. (K1)

421-K. Ductile Iron: What It Is, What It Does, Where It's Used, and How to Weld It. H. C. Waugh. *Industry & Welding,* v. 29, Aug. 1956, p. 48-52, 78-81.

Several times stronger than gray cast iron, 4 to 12 times tougher and so ductile it can be bent and twisted without breaking, this metal is welded in much the same way as cast iron. (K1, Q23, CI)

422-K. Semi-Automatic Inert Arc Puts Aluminum in the Swim. Charles Berka. *Industry & Welding,* v. 29, Aug. 1956, p. 54-56, 81.

Some details of use of consumable electrode inert-arc welding of strong, light-weight thick plate aluminum to fabricate pools which are competitively priced with those of other good construction, yet can be installed in less time and with much less effort. (K1, Al)

423-K. Assembly Line Welding Speeds Fabrication of Tunnel Tubes. *Industry & Welding,* v. 29, Aug. 1956, p. 58 + 5 pages.

Equipment and welding procedures. (K1)

424-K. How to Weld Special Corrosion-Resistant Stainless Steels. G. J. Gibson. *Industry & Welding,* v. 29, Aug. 1956, p. 66 + 5 pages.

Characteristics of supercorrosion resistant stainless steels; recommended welding procedures. (K1, SS)

425-K. Positioneering. III. Charles N. Aronson. *Industry & Welding,* v. 29, Aug. 1956, p. 74-76, 78.

The lever principle and how it affects weldment positioning. (To be continued.) (K1)

426-K. How We Weld Light Gage Stainless Steel Tubing. Raymond Gardner. *Industry & Welding,* v. 29, Aug. 1956, p. 110-111.

Use of a special welding torch in conjunction with the inert-gas tungsten-arc process has made it possible. (K1, SS)

427-K. Bronze Filler Rod for Sheet Metals. C. A. Medsker. *Industry & Welding,* v. 29, Aug. 1956, p. 85-86, 88-89.

Strong braze welded joints are dense, nonporous and have no lumpy spots. Surface is clean and bright and easily dressed for final finishing. (K2, Cu)

428-K. Induction Heating Streamlines Production-Brazing Practices. C. W. Holt. *Machinery,* v. 62, Aug. 1956, p. 150-155.

Areas to be brazed should not be heated too rapidly; joint strength is dependent on proper clearances; type and application of flux affect joint quality; considerations in the design of applicable fixtures. (K8)

429-K. How to Use Fluxes and Solders for Good Joints. W. P. McQuillan. *Metalworking Production,* v. 100, July 13, 1956, p. 1072-1075.

Types of fluxes, their characteristics and uses. (K7)

430-K. Fixtures for Brazing. I. A. M. Setapen. *Welding Engineer,* v. 41, Aug. 1956, p. 21-23.

Considerations to be made in designing jigs of metal or ceramics. (To be continued.) (K8)

431-K. Careful Welding Allows Wide Use of 430 Stainless. J. A. Goodford and E. A. Loria. *Welding Engineer,* v. 41, Aug. 1956, p. 35-36.

Situations to be avoided in gas or

electric welding of 430 stainless. (K1, K2, SS)

432-K. Insert Rings Help Prevent Root-Pass Weld Cracks. Helmut Thielsch. *Welding Engineer,* v. 41, Aug. 1956, p. 42, 44.

Details to be followed in tungsten inert-gas welding. (K1)

433-K. Project Undertakes Electode Analysis for Mild Steel Welding. Julian D. Carey and Robert D. Mann. *Welding Engineer,* v. 41, Aug. 1956, p. 72, 74.

Determination of optimum compositions and conditions for mild steel welding by the inert-gas process. (K1, K9, ST)

434-K. (French.) **Laying, Welding, and Testing Welds in Large Pipe Lines.** H. Gerbeaux. *Revue de la soudure* (Brussels), v. 12, no. 2, Feb. 1956, p. 71-87.

Chemical and mechanical properties of the pipe, preparation, electrode used, welding apparatus, training the welders, the actual welding procedure, special problems such as crossing roads and water, testing procedures. (K general)

435-K. (French.) **Soldering With Silver Solders. Actual Technique and New Developments.** Hans Rudolph and Ewald Wagner. *Revue de la soudure* (Brussels), v. 12, no. 2, Feb. 1956, p. 88-96.

Silver solders may be more economical to use than bronze welding. Advantages include lower working temperatures, greater fluidity, strong joints, corrosion resistance and good thermal and electric conductivity. May be used with induction heating. Special solders. (K8, Ag)

436-K. (French.) **Some Considerations Relative to the Welding of Alloyed Steels Used in the Construction of Modern Heating Machines.** A. Lüthy. *Soudage et Techniques Connexes,* v. 10, no. 5-6, May-June 1956, p. 117-129; disc., p. 129-131.

The welding of ferritic and austenitic steels for gas generators, gas turbines, steam turbines and jet engines. (K general, T25, AY)

437-K. (French.) **The Welded Construction of Large Oil Tankers.** J. Grenet. *Soudage et Techniques Connexes,* v. 10, no. 5-6, May-June 1956, p. 133-143; disc., p. 144-147.

The increase in size of tankers requires new techniques in shipbuilding. New problems and technique in welding the hulls require new materials, thicker steel plate. New assembly techniques; some "prefabrication" suggestions; weld testing. (K general, T22)

438-K. (French.) **Hard Surfacing and Welding in Clad Metal Construction.** H. Gerbeaux. *Soudage et Techniques Connexes,* v. 10, no. 5-6, May-June 1956, p. 148-154.

Methods of hard surfacing and joining of clad steels, types of electrodes for welding clad metals, use of small inserts, homogeneous and heterogeneous hard surfacing. (K1, L24, ST)

439-K. (German.) **Deep-Penetration Electrodes. Weldability and Economy in Welding With the Aid of Transformers and Rectifiers.** Herbert Neumann. *Oerlikon Schweissmitteilungen,* v. 13, no. 23, 1955, p. 5-23.

An investigation into various aspects of the use of transformers and rectifiers in deep-penetration welding. General requirements, welding transformers, welding rectifiers, intensity of welding current, diameter of electrodes, proper and faulty procedures, comparative economy of the method and outlook for further development. (K1)

440-K. (German.) **New Insights and Development in the Field of Metallurgy of Welding of Ferrous Materials.** K. L. Zeyen. *Oerlikon Schweissmitteilungen,* v. 13, no. 23, 1955, p. 25-69.

An installment, covering the period from spring 1954 to summer 1955, of a comprehensive survey and evaluation of about 340 publications from all over the world on the latest problems and developments in the general field of the metallurgy of welding ferrous materials. An extensive bibliography is included. (K general, Fe)

441-K. (Russian.) **Welding by Means of Electro-Rivets in CO_2 Atmosphere.** N. M. Novozhilov and A. M. Sokolova. *Svarochnoe Proizvodstvo,* no. 7, July 1956, p. 10-13.

New method of using electrode wires with a higher content of deoxidizing agents in a carbon dioxide atmosphere. (K1)

442-K. Synthetic-Resin Bonding, the Use of Redux and Araldite Adhesives in the Australian Jindivik Aircraft. I. Constructions: Bonding Technique: Tooling Methods. G. D. Bennett. *Aircraft Production,* v. 18, Aug. 1956, p. 300-305.

Design considerations affecting the type of structure and the type of adhesive chosen; fabrication and tooling methods. (K12)

443-K. The Influence of Weld Faults on Fatigue Strength With Reference to Butt Joints in Pipe Lines. R. P. Newman. *Institute of Marine Engineers, Transactions,* v. 68, June 1956, p. 153-172.

The root zone of welds, with and without backing rings, exercises a predominant influence on fatigue behavior. Except in the case of lack of penetration, defects show no significant effect on fatigue strength. (K1, K2, Q7)

444-K. Welding of Steam and Feed Pipework for Marine Installations. J. Chamberlain and W. L. Roe. *Institute of Marine Engineers, Transactions,* v. 68, June 1956, p. 173-182; disc., p. 183-192.

The welding, heat treatment and nondestructive testing of joints in alloy steels made by manual methods only. (K1, T22, S13, AY)

445-K. Epoxy-Base Adhesives in the Aircraft Industry. William Bandaruk. *SPE Journal,* v. 12, Aug. 1956, p. 20-23, 50.

Advantages include ease of application, excellent basic adhering qualities to many kinds of metallic and nonmetallic surfaces, simplicity and versatility in compounding and development, resistance to aircraft fluids and environmental conditions and satisfactory physical properties. (K12, T24)

446-K. Welding of Austenitic Chromium-Nickel Steels and Other Heat Resisting Alloys. E. P. L'vova. *Henry Brutcher, Translation No.* 3712, 12 p. (From *Svarochnoe Proizvodstvo,* no. 11, 1955, p. 27-31.) Henry Brutcher, Altadena, Calif.

Review of American and British literature and comparison with Russian studies. (K general, SG-h, SS)

447-K. Argon-Arc Welding of Commercially Pure Titanium. E. A. Taylor and D. C. Moore. *Welding and Metal Fabrication,* v. 24, Aug. 1956, p. 268-280.

The influence of weld backing, argon flow and the use of supplementary and modified shrouds on weld quality. Technique for retstricting atmospheric contamination. Examination of welds. (K1, Ti)

448-K. Nickel-Manganese Brazing of Steel. R. A. Gustafson. *Welding and Metal Fabrication,* v. 24, Aug. 1956, p. 290-291.

Controlled atmosphere furnaces yield joints with good corrosion resistance and high-temperature strength. (K8, Ni, Mn, ST)

449-K. Ultrasonic Welding. J. Byron Jones and James J. Powers, Jr. *Welding Journal,* v. 36, Aug. 1956, p. 761-766.

Elastic vibratory energy is introduced into the areas to be joined to effect solid-state bonding between similar and dissimilar metals. (K6)

450-K. Welded Overlay Rotating Bands. Frank W. Hussey and Irving G. Betz. *Welding Journal,* v. 35, Aug. 1956, p. 767-775.

Rotating bands applied to projectiles by the inert-gas-shielded metal-arc process with the aid of an auxiliary filler wire have shown great promise in ballistic tests, in technical feasibility and in economy. (K1, Cu)

451-K. Comparative Properties of Electrodes for Arc Welding Austenitic Manganese Steels. W. L. Lutes and H. F. Reid, Jr. *Welding Journal,* v. 35, Aug. 1956, p. 776-783.

There are significant quantitative differences in the properties of four basic types of materials commonly used for fabrication or build-up. (K1, SS)

452-K. (German.) **Transformation and Weldability of Low Alloy Steels.** Wilhelm Hofmann and Reinhard Müller. *Schweissen und Schneiden,* v. 8, no. 7, July 1956, p. 237-240.

Measuring instruments, model experiments and welding experiments. (K9, N8, AY)

453-K. Types of Fluxes and Alloys for Different Materials. Soldering and Brazing. R. C. Jewell. *Metal Industry,* v. 89, Aug. 3, 1956, p. 83-86.

Materials used for soldering and brazing of a variety of metals and alloys. (To be continued.) (K7, K8)

454-K. Soldering and Brazing. R. C. Jewell. *Metal Industry,* v. 89, Aug. 10, 1956, p. 103-106.

Types of fluxes and alloys for different materials. (K7, K8)

455-K. Three Ways to Weld Titanium. J. W. Cunningham. *Steel,* v. 139, Aug. 27, 1956, p. 84-86.

At temperatures over 1000° F., the metal absorbs nitrogen and oxygen from air, which makes it too brittle. Inert gas offers satisfactory protection. (K1, Ti)

456-K. (Czech.) **Welding of Gray Cast Iron With the Electrodes VUS.** Ladislav Lakatos. *Slévarenstvi,* v. 4, no. 7, July 1956, p. 213-218.

Necessity of considering metallurgical processes of welding, and a thorough knowledge of solidification dynamics of welding metals and thermal expansion. (K1, N12, CI)

457-K. (Czech.) **Flame Welding Heavy Gray Iron Castings Heated With Propane-Butane Burners.** Rudolf Halbich. *Zvaranie,* v. 5, no. 3, Mar. 1956, p. 87-90.

Method makes possible welding which otherwise is very difficult. Construction and use of the burners. Some examples of castings welded by this method. (K2, CI)

458-K. (German.) **Inert Gas Welding of Copper and Its Alloys.** Lothar Wolff and Wilhelm Mantel. *Zeitschrift für Metallkunde,* v. 47, no. 7, July 1956, p. 459-465.

Equipment and work-locating fixtures for argon-arc and sigma welding. Quality factors. (K1, Cu)

459-K. (German.) **Testing and Evaluation of Autogenous Welded Joints of Zinc and Zinc Alloys.** Nikolaus Ludwig. *Zeitschrift für Metallkunde,* v. 47, no. 7, July 1956, p. 473-477.

Factors to be considered in development of testing methods. Evaluation of gas-welded plate joints. (K9, K2, Zn)

460-K. (German.) **State of Magnesium Welding.** Ernst Rubo. *Zeitschrift für Metallkunde,* v. 47, no. 7, July 1956, p. 466-473.

Methods for welding magnesium and its alloys, and their fields of application. (K general, Mg)

461-K. (German.) **Progress in Fusion Welding Nonferrous Metals and Alloy Steels.** Richard Dümpelmann. *Zeitschrift für Metallkunde,* v. 47, no. 7, July 1956, p. 478-486.

Survey of processes in use, significance of the various methods and of the composition of the welding wire for aluminum, copper, nickel and their alloys as well as cast iron and alloy steels. (K1, K2, K3, EG-a, AY)

462-K. (German.) **Behavior of Welded Light Metals of the Type AlZnMg 1.** Albrecht Müller-Busse. *Zeitschrift für Metallkunde,* v. 47, no. 7, July 1956, p. 486-490.

Original ultimate strength values are reached again after approximately three months of aging at room temperature. Fatigue strength slightly declines. Corrosion resistance is good. (K1, K2, K9, Al)

463-K. (German.) **Wettability of Solders.** Albert Keil. *Zeitschrift für Metallkunde,* v. 47, no. 7, July 1956, p. 491-493.

Wetting of the solid metal surface is facilitated by interfacial reactions with the liquid solder. Wetting of ceramic materials by liquid metals is also possible if diffusion, oxidation or reduction processes take place between ceramic material and metal. (K7, P10)

464-K. (German.) **Hard Soldering in Protective Atmosphere in an Electric Resistance Furnace.** Gerhard Simon. *Zeitschrift für Metallkunde,* v. 47, no. 7, July 1956, p. 494-499.

Appropriate equipment such as hard soldering furnaces, control equipment and protective gas generators. (K7)

465-K. (German.) **Copper and Copper-Alloy Welding Materials, and Hard Solders.** Hans Klein. *Zeitschrift für Metallkunde,* v. 47, no. 7, July 1956, p. 499-506.

Data on composition, physical properties, ultimate stress values and suitability for the different welding processes and use on the various base metals. (K general, T5, Cu)

466-K. (German.) **Problems of Production of Structural Metal Joints With Plastics.** Konrad Meyerhands. *Zeitschrift für Metallkunde,* v. 47, no. 7, July 1956, p. 506-516.

Mode of action and composition of the customary metal bonding agents; examples of advantages offered by resin-bonded metals. (K12)

467-K. (German-French.) **Attempt at Determination of Bonding Temperature.** René D. Wasserman and G. M. A. Blanc. *Zeitschrift für Schweisstechnik,* v. 46, no. 8, Aug. 1956, p. 182-187.

Method of determining minimum brazing temperature to which base metal must be brought in order to effect a good bond with the molten filler metal. (K8)

468-K. (Russian.) **The Aging of Tin-Lead Solders and of Joints Made With Them.** A. S. Medvedev. *Metallovedenie i Obrabotka Metallov,* no. 7, July 1956, p. 16-23.

Changes in mechanical properties of Russian solders and joints. (K7, Q23, Sn, Pb)

469-K. (Slovak) **Contribution to the Seam Welding of Mild Carbon Steels.** *Zvaranie,* v. 5, no. 3, Mar. 1956, p. 79-82.

Experiments made in welding 2-mm. steel sheet. Problems presented by occluded gases, problems of varying chemical composition of steels which are supposed to be uniform, and how this affects the weldability. (K3, K9, CN)

470-K. (Slovak.) **Welding Gray Cast Iron With VVS-Bimetal Electrodes.** Ladislav Lakatos. *Zvaranie,* v. 5, no. 6, June 1956, p. 182-187.

A copper-iron electrode (iron wire

coated with copper) is used in repairing casting defects. Problems of welding cast irons.
(K1, T5, Cu, Fe, CI)

471-K. (Spanish and English.) **Wedge Test Piece for the Definition of a Steel With Regard to Its Electric Arc Welding.** Felipe Angel Calvo Calvo. *Ciencia y Tecnica de la Soldadura,* v. 6, no. 30, May-June 1956, 21 p.

Concludes that there is no such property as "weldability". Wedge test pieces indicate the transformation pearlite to eutectoid austenite to martensite. (K9, ST)

472-K. Welding Technology Since 1950. H. J. Nichols. *Canadian Metals,* v. 19, Aug. 1956, p. 18 + 5 pages.

Recent developments contributing to improvement of welding mainly through higher speeds and lower costs. (K1)

473-K. How to Weld Special Corrosion-Resistant Stainless Steels. G. J. Gibson. *Industry & Welding,* v. 29, Sept. 1956, p. 66-68, 71-73.

Joint design data, assembly methods, welding dissimilar metals, tubing, pipe and clad material and cleaning of welds. (K1, SS)

474-K. How to Pick Electrodes for Production Welding. J. E. Hinkle. *Iron Age,* v. 178, Sept. 6, 1956, p. 104-106.

Since time and labor constitute the major portion of cost, the fastest electrode that meets job specifications is desired. (K1, CN)

475-K. How to Braze Stainless. I. H. M. Webber. *Steel,* v. 139, Sept. 3, 1956, p. 94-95, 97, 100.

Techniques for brazing stainless steels with troublesome constituents such as silicon, titanium and aluminum. (K8, SS)

476-K. (Russian.) **Intensification of the Heating of Metal in Contact Butt Welding Through Intensifying the Oxidation Reactions.** V. K. Lebedev and S. I. Kuchuk-Iatsenko. *Avtomaticheskaia Svarka,* v. 9, no. 3, May-June 1956, p. 36-43.

Blowing with air or air-oxygen mixtures intensifies heating and improves quality of welded joints.
(K1, CN)

477-K. (Russian.) **Thermal Expansion of Metal as a Regulating Parameter During Spot Welding Duralumin.** Iu. A. Pachentsev. *Avtomaticheskaia Svarka,* v. 9, no. 3, May-June 1956, p. 65-71.

A movable electrode shows the expansion of the metal during the welding process. Best results are achieved when welding current is shut off slightly before the maximum expansion is reached.
(K3, P11, Al)

478-K. (Russian.) **Welding of Austenitic Oxygen-Resistant Steels EI-530, EI-628, and EI-629.** A. S. Astaf'ev and A. V. Russiian. *Avtomaticheskaia Svarka,* v. 9, no. 3, May-June 1956, p. 72-78.

Automatic and manual electric arc flux welding. Chemical composition of the steels and mechanical properties, including resistance to deformation. (K1, Q23, SS)

479-K. (Book.) **Development of Coated Arc Welding Electrodes Which Shall Produce Welded Joints Heat Treatable to Strength Levels of 220,000 to 240,000 and 260,000 to 280,000 Pounds Per Square Inch.** D. C. Smith. 30 p. Harnischfeger Corp., Electrode Division, Research Laboratory, 2151 S. Robinson Ave., Milwaukee 7, Wis.

Production of electrodes to deposit sound weld metal that will develop physical properties comparable to those of alloy base metals when heat treated under the same processes.
(K1, T5, AY)

480-K. (Book—French.) **Resistance Electric Welding and Its Application in Aircraft Industry.** G. Moressée. 366 p. 1954. Génin, Paris, France.

Review of welding applications in the aircraft industry in Europe and the United States; includes materials, welding equipment, and design data. (K3, T24)

481-K. Consumable Solid Insert Rings Improve Pipe Welding Quality. Helmut Thielsch. *Heating, Piping & Air Conditioning,* v. 28, Sept. 1956, p. 105-108.

Recommended techniques minimize human variable welding effects, give favorable weld contours that resist cracking and produce metallurgically sound weld metal composition. (K1, SS)

482-K. New Flash Welder Trims Flash as It Welds. *Iron Age,* v. 178, Sept. 20, 1956, p. 94-95.

Dies shave off flash and upset almost entirely. Only highly finished products need further finishing. (K3)

483-K. Welding Magnesium Alloy Castings. *Metal Industry,* v. 89, Aug. 24, 1956, p. 148-150.

Problems of repair of damaged aircraft parts. (K1, K2, Mg)

484-K. Selecting Brazing Alloys. Roger A. Long. *Product Engineering,* v. 27, Sept. 1956, p. 191-196.

Factors affecting design and strength of brazed joints. Brazing techniques, filler materials and processes available for bonding aluminum, steel, cast iron, magnesium, titanium and special metals such as beryllium and zirconium. (K8, SG-f)

485-K. Welding Steel by the Inert-Gas-Shielded Metal-Arc Process. A. R. Muir. *Sheet Metal Industries,* v. 33, no. 353, Sept. 1956, p. 599-605, 613-614; disc., p. 614-616.

Self-adjusting characteristics of arc welding process for stainless and mild steels, advantages, limitations, costs. (K1, SS, ST)

486-K. Hard Soldering of Aluminium and Aluminium Alloys. R. C. Jewell. *Sheet Metal Industries,* v. 33, no. 353, Sept. 1956, p. 606-613.

"Thesscal" hard-soldering process, strength of joints, corrosion resistance, applications, treatment after soldering, soft soldering. (K7, Al)

487-K. How to Braze Stainless. H. M. Webber. *Steel,* v. 139, Sept. 10, 1956, p. 158-160, 162.

Individual study necessary to determine best means of heating, cooling and atmospheric protection. Size, weight, configuration, number of joints, type of base metal, type of filler metal and its melting point are important factors. (K8, SS)

488-K. Developments in Stainless-Steel Welding in the Nuclear Program. E. B. LaVelle, L. H. Rasmussen and E. M. Kuchera. *U. S. Atomic Energy Commission, TID-*8013, Aug. 1956, 19 p.

New technique for joining austenitic stainless steel weld joints at the closure pass means that satisfactory uniformity of the inner weld surface can be obtained with comparative ease. A controlled ferrite composition can be introduced into the weld area. (K1, SS)

489-K. Fluxless Solder Defeats Aluminum Oxide. Samuel Freedman. *Welding Engineer,* v. 41, Sept. 1956, p. 36-37.

Development of several alloy solders with melting ranges between 400 to 800° F., which are used without flux to join metals such as aluminum and copper.
(K7, Al, Cu, Pb, Zn)

490-K. Status of Efforts to Develop Nonmanual Pipe-Line Welding Methods. Paul S. Reed. *Welding Journal,* v. 35, Sept. 1956, p. 877-883.

The carbon-dioxide gas process appears to be the most attractive possibility for pipe-line welding, provided that the quality of welding at the bottom of the pipe can be improved to meet requirements. (K1)

491-K. Silver-Brazing Lap Joints in Stainless-Steel Tubing. G. H. Bohn. *Welding Journal,* v. 35, Sept. 1956, p. 884-889.

If the lap of a properly made joint is made three times the thickness of the tubing, the joint will be stronger than the tubing with internal pressure, tension stresses due to thermal expansion and dead load, or a combination of the two.
(K8, Ag, SS)

492-K. Inert-Gas-Shielded Metal-Arc-Spot Process. J. W. Kehoe and H. J. Bichsel. *Welding Journal,* v. 35, Sept. 1956, p. 895-903.

Recent equipment modification enables use for short-timed localized welds in the form of plug, fillets, outside corners or butt welds in addition to use as standard welding tool. (K1, Al, ST)

493-K. Mild-Steel Weld-Metal Porosity. J. T. Ballass and R. D. Stout. *Welding Journal,* v. 35, Sept. 1956, p. 409S-415S.

Influence on porosity level was observed for such variables as base-metal composition, electrode composition, current level, shielding-gas composition and additives to the welding site. (K1)

494-K. The Effects of Zinc Phosphate Coating on Flash Welding of Steel Tubing. J. F. Young and A. Phillips. *Welding Journal,* v. 35, Sept. 1956, p. 416S-420S.

Phosphorus from zinc phosphate coating tends to enter the flash weld zone, thereby resulting in brittle welds of low notch-bend strength. (K3, L14, ST)

495-K. Basic Characteristics of Some Heat-Resisting Brazing Filler Materials. W. H. Chang. *Welding Journal,* v. 35, Sept. 1956, p. 431S-443S.

Advantages and limitations of nickel-chromium-boron, nickel-chromium-silicon and gold-nickel brazing filler materials evaluated on the basis of experimental results.
(K8, SG-f)

496-K. Mechanism of Bonding in Cold Welding of Metals. S. B. Ainbinder and E. F. Klokova. *Henry Brutcher Translation No.* 3755, 20 p. (From *Latvijas PSR Zinatnu Akademijas Vestis,* no. 10 (87), 1954, p. 113-128.) Henry Brutcher, Altadena, Calif.

Reviews formation of bonds between metal surfaces in cold welding. Behavior of aluminum, copper,

cadmium, tin and lead in cold welding in air and in vacuum. (K5, Al, Cu, Cd, Sn, Pb)

497-K. (German.) **Welding Techniques in Constructing Boilers, Vessels and Piping in the Soviet Union.** W. Gellert. *Energietechnik,* v. 6, no. 8, Aug. 1956, p. 353-358.

Review of methods for welding low or medium-carbon steels or austenitic steels and testing the welding seam. Working materials and methods. Practical suggestions for the German industry. (K1, K2, ST)

498-K. (German.) **Influence of Steel Quality in Oxy-Acetylene Welding of Thin Sheets.** W. Hofmann, R. Müller and J. M. Sistiaga. *Schweissen und Schneiden,* v. 8, no. 8, Aug. 1956, p. 278-280.

Comparative investigations in the weldability of thin steel sheets with different deoxidation rates for enameling requirements. (K9, K2, ST)

499-K. (German.) **Considerations on the Importance of the Physical Processes in the Welding Arc.** W. Mantel. *Schweissen und Schneiden,* v. 8, no. 8, Aug. 1956, p. 280-287.

Physical principles of arc welding with nonconsumable tungsten and consumable metallic electrodes. (K1)

500-K. (German.) **Welding of Titanium Alloys.** Karl Bungardt and Klaus Rüdinger. *Zeitschrift für Metallkunde,* v. 47, no. 8, Aug. 1956, p. 585-593.

Properties of protective gases; inert-gas-shielded-arc welding procedures. (K1, Ti)

501-K. (Russian.) **Advanced Welding Method in Assembling Reinforcement Steel.** V. Ia. Dul'kin. *Mekhanizatsiia Stroitel'stva,* v. 13, no. 8, Aug. 1956, p. 16-20.

Study of recent method of arc welding applied to reinforcement steel of 32 to 90 mm. diam., directly on the structure. The rods are butt-welded, keeping the metal in a molten state throughout the process. (K1, ST)

502-K. The Performance of Some Soft Solders at Elevated Temperatures and Pressures. H. E. Pattee and R. M. Evans. *American Society for Testing Materials, Preprint no.* 89d, 1956, 11 p.

A number of altered tin-lead solders were tested under cyclic loads at 225° F., the results indicating the superiority of high-tin solders. Data on the effects of various additions. (K7, Pb, Sn)

503-K. Methods of Multiple Spot Welding for High Speed Production. H. W. Roth. Paper from "International Institute of Welding Annual Meeting 1956, Madrid". American Welding Society, 10 p.

Advantages and disadvantages of automatic welding, including the ultra-speed system and "Multiple Trafo" welding. Common to these is the use of individual electrode-units, either spring-loaded or hydraulically or air-operated. (K3)

504-K. (French.) **Considerations on the Welding of Carbon or Low-Alloy Steels of Various Grades, Used in the Construction of Petroleum Refining Equipment.** H. Gerbeaux and H. Granjon. *Soudage et Techniques Connexes,* v. 10, no. 718, July-Aug. 1956, p. 175-183.

Various technical considerations and experiments concerning steel in relation to welding. Suggested improvements in the existing specifications. (K1, T29, K9, ST)

505-K. (French.) **Determination of the Wetting Temperature of Brazing Filler Metals on Steel.** M. Evrard. *Soudage et Techniques Connexes,* v. 10, no. 718, July-Aug. 1956, p. 211-214.

The wetting temperature in brazing is lower than the fusion point. When wetting begins, there is apparently a dissolution of the base metal in the liquid filler metal. (K8, P10, ST)

506-K. (French.) **Factors Increasing Productivity, With Particular Reference to Shipbuilding.** Antonio Cergna. Paper from "International Institute of Welding Annual Meeting 1956, Madrid". American Welding Society, 25 p.

Four types of arc welding were studied, with reference to nature and intensity of welding current, welding voltage and speed, electrode diameter, fluxes, arc adjusting system, details of the welding head and preparation of edges. (K1)

507-K. (French.) **Productivity by Brazing.** G. M. A. Blanc and J. C. Charton. Paper from "International Institute of Welding Annual Meeting 1956, Madrid". American Welding Society, 11 p.

Factors determining cost of a brazed assembly. The relationship price—fusion time for a series of filler metals. Various examples of series produced brazed assemblies using as heat sources the oxy-acetylene torch gas flame, an oven, or high-frequency induction. (K8)

508-K. (Swedish.) **Investigation of Welds on Superheater Tubes of Ferritic Alloy Steels.** Sakari Heiskanen and Kaj Tikkanen. *Jernkontorets An-*

naler, v. 140, no. 8, 1956, p. 529-550.

Welding tests were made on cold rolled tubes of three superheater qualities. Samples were submitted to a flattening test, chemical analysis of the welding material, a hardness test and microscopic investigation. (K9, AY)

509-K. Consumable Solid Insert Rings Improve Pipe Welding Quality. Helmut Thielsch. *Heating, Piping & Air Conditioning,* v. 28, Oct. 1956, p. 100-103.

Recommended joint designs and methods of making the weld for stainless steel piping. (K1, SS)

510-K. Positioneering. V. Welding Processes and How They Affect Positioning of Weldments. Charles N. Aronson. *Industry & Welding,* v. 29, Oct. 1956, p. 148-150, 153-155.

Factors influencing selection of positioner. Precise positioning will increase speed and improve quality of welding. (To be continued.) (K1)

511-K. New Flux for Soldered Joints in Aluminium Conductor Cable. *Light Metals,* v. 19, Sept. 1956, p. 274-275.

Comparative tests show that joints made with "Junal 5" are more solidly filled and are at least equal to those made with the best organic flux in respect to conductivity and mechanical strength. (K7, Al)

512-K. Soldering in a Controlled Atmosphere. A. C. Starrenburg. *Machine and Tool Blue Book,* v. 51, Oct. 1956, p. 136-140.

Annual production increased from 75,000 to 1,200,000 pieces; costs were reduced and no flux was necessary. Operation of electric furnace described. (K7, Ag)

513-K. Silver Brazing of Titanium. Nathan A. Tiner. *Sheet Metal Industries,* v. 33, no. 354, Oct. 1956, p. 707-712.

Some metallurgical aspects. (K8, Ag, Ti)

514-K. Spot and Seam Welding of Titanium and Titanium Alloys. D. F. Dawson. *U. S. Department of Commerce, Office of Technical Services,* PB111707, Apr. 1954, 189 p.

The spot welding and seam welding processes may be readily applied to production grades of commercially pure titanium sheet, the oxygen-nitrogen-titanium-base alloy Ti-100A, and the 8% manganese titanium-base alloy. (K3, Ti)

515-K. Investigation of Mechanical Fastenings for Solid Turbine Blades Made From Ductile Materials. André J. Meyer, Jr., Albert Kaufman and W. C. Caywood. *U. S. National Advisory Committee for Aeronautics, Research Memorandum* E54E21, Aug. 1954, 45 p.

Three fir-tree root designs were evaluated in short and long-time pull tests at temperatures up to 1500° F. Root strength was found to depend on cross-sectional areas carrying the load and not on size or number of serrations. (K13)

516-K. Experiments With Carbon Dioxide Shielded Welding of Mild Steel. R. E. Jahn and L. M. Gourd. *Welding and Metal Fabrication,* v. 24, Oct. 1956, p. 368-376.

Three commercially available electrodes evaluated for use with carbon dioxide shielding in welding particular compositions of semi-killed mild steel plate. (K1, CN)

517-K. (Czech.) **Controlling Submerged Arc Welding With a Magnetic Amplifier.** Pavel Milos Zuffa. *Zvaranie,* v. 5, no. 7, July 1956, p. 212-213.

Application of above to submerged arc welding; disadvantage of the inherent time delay. (K1)

518-K. (Russian.) **Welding of Alloy Steel Piping for Oil Refineries.** L. S. Livshits. *Stroitelstvo Predpriiatii Neftianoi Promyshlennosti,* v. 1, no. 5, July 1956, p. 3-6.

Welding methods for alloy steels, depending on their composition. Ways of forestalling welding defects connected with their low heat conductivity and excessive tendency to hardening during cooling. (K1, AY)

519-K. (Book.) **Handbook for Adhesives.** Sections not paged. Bloomingdale Rubber Co., Chester, Pa.

A looseleaf manual on the FM-47 adhesive system. The exceptional strength and reliability of this adhesive are valuable in aircraft structures. Data on processes for bonding, and material properties of bonded elements are given. (K12)

520-K. (Book.) **Resistance Welding, Theory and Use.** 163 p. 1956. Reinhold Publishing Corp., 430 Park Ave., New York 22, N. Y.

Covers all resistance welding processes including types of machines, electrodes, and controls. Discusses weldability of different metals and how quality control and inspection tests and methods are applied to obtain consistently good welds. (K3, K9, S general)

521-K (Book—English, French, and Spanish.) **International Institute of Welding Annual Meeting 1956, Madrid.**

Sections individually paged. 1956. American Welding Society, 33 W. 39th St., New York 18, N. Y.

Twenty-eight papers on ways of increasing productivity discuss professional training, research and control, oxygen cutting, shipbuilding, and fabrication aspects. Pertinent papers are individually abstracted. (K general, G22)

522-K. Welding High-Pressure Pipe Lines: A New Automatic Pressure Butt-Welding Process. J. E. Burton and J. N. Bradley. *Engineering,* v. 182, Sept. 28, 1956, p. 399-404.

Automatic pressure welding process for mild and low-alloy steel pipes in which the plasticity of the steel is allowed to control its own welding cycle. (K2, AY)

523-K. Automatic Submerged-Arc Welding of Alloy Steel. R. A. Wilson. *Metal Progress,* v. 70, Oct. 1956, p. 104-107.

Welds with properties that match those of the parent alloy steel can be made using mild steel wire and special fluxes which supply the alloying elements required. (K1, AY)

524-K. How to Weld Gas-Turbine Alloys. A. L. Cooper and H. L. Printz. *Metalworking Production,* v. 100, Oct. 12, 1956, p. 1642-1647.

Materials and techniques used in welding stainless steels and superalloys for gas turbines. (K1, K3, SG-h, SS)

525-K. Welding and Brazing. A Bibliography of Unclassified Report Literature. *U. S. Atomic Energy Commission,* TID-3301, July 1956, 32 p.

Materials of interest to nuclear technology. Author, subject, and report-number indexes included. (K general)

526-K. (French.) **Present State of Deep Penetrating Technique.** G. Doneux. *Revue de la Soudure (Brussels),* v. 12, no. 3, 1956, p. 159-166.

A critical survey of the methods used in end-to-end joint welding through deep penetrating electrodes. A theoretical study of angle joint welding. Various curves and tables. (K1)

527-K. (German.) **Prevention of the Formation of Martensite in Electric Arc Welding.** Fritz Dechner and Hermann Speich. *Stahl und Eisen,* v. 76, no. 19, Sept. 20, 1956, p. 1249-1251.

Tests are carried out in the weld seam and in the zone affected by the heat, by following up the weld with an annealing burner of appropriate length in a definite distance from the electrode. (K1, N8, ST)

528-K. (German and French.) **Joining Aluminum With Other Metals.** E. Zurbrügg. *Aluminium Suisse,* v. 6, no. 5, Sept. 1956, p. 174-180.

Joining in noncorrosive surroundings and with anticorrosive precautions. Joining through clamping or gluing, hard soldering and welding. (K general, Al)

529-K. (Hungarian.) **Employing Welding and Heat Treatment for Repairing Machine Tool Castings.** Miklos Cseh. *Ontöde,* v. 7, No. 9, Sept. 1956, p. 197-200.

Welds of gray cast iron must not be harder than the casting itself. Normalizing eliminates detrimental hardness differences. (K1, J24, CI)

530-K. (Russian.) **A Study of the Kinetics of Grain Growth and Changes in the Structure and Mechanical Properties in the Weld Area of Low-Alloy Steels.** M. Kh. Shorshorov, G. N. Klebavno and L. S. Gushchina. *Svarochnoe Proizvodstvo,* no. 9, Sept. 1956, p. 1-4.

A method and apparatus for evaluation of the weldability of metals from the change in their mechanical properties and structure in the heat affected zone at any stage of the welding cycle. (K9, AY)

531-K. (Russian.) **Testing Electrodes for Welding of High-Quality Steel.** A. A. Erokhin. *Svarochnoe Proizvodstvo,* no. 9, Sept. 1956, p. 4-9.

Test data on a number of electrodes. Best results were obtained with joints welded with medium-alloy electrodes containing chromium, manganese, silicon and 0.1 to 0.2% carbon. (K1, K9, AY)

532-K. (Russian.) **Method of Testing Welded Joints for Cracking on Hull Structures of Vessels.** K. G. Nikolaev and B. A. Gololobov. *Svarochnoe Proizvodstvo,* no. 9, Sept. 1956, p. 9-12.

A method of testing weld joints of marine hull structures under simulated conditions of welding. A specially assembled specimen is used. (K9)

533-K. (Russian.) **Automatic Welding of Steam Turbine Diaphragms.** L. A. Mel'nikov and Z. L. Klimovitskii. *Svarochnoe Proizvodstvo,* no. 9, Sept. 1956, p. 19-21.

A method and a machine for automatic welding of steam turbine diaphragms. (K1, T25)

534-K. The Welding of Cr-Mo Low-Alloy Steels for Oil-Industry Equipment. F. F. Ates, L. Capel and C. P. M. Kijm. *British Welding Journal,* v. 3, Oct. 1956, p. 457-463.

Laboratory investigation of various factors affecting weldability of low alloy steels; the criteria applied. (K9, AY)

535-K. The Welding of 13% Chromium Steels. J. A. McWilliam. *British Welding Journal,* v. 3, Oct. 1956, p. 464-468.

Tests were carried out on butt welds in ½-in. and ⅛-in. plate, and also on steel welds; mention is made of the welding of cutlery-quality steel. (K1, SS)

536-K. The Welding of Spheres and Bullets in situ. M. J. Noone and W. C. Holliday. *British Welding Journal,* v. 3, Oct. 1956, p. 477-485.

Welded construction of large pressure vessels for storage of gases and liquids. Discusses materials of construction, shop fabrication, erection and preparation, ambient conditions, inspection, stress relieving and methods of testing. (K1, J1, CN, ST)

537-K. Austenitic Welds in 5% Cr, 0.5% Mo Steel Pipes. H. G. Geerlings and W. P. Kerkhof. *British Welding Journal,* v. 3, Oct. 1956, p. 469-477.

Advantages and disadvantages. Mechanical properties of welds and influence of service temperature are considered, with attention devoted to heat affected zone between weld metal and parent material. (K1, Q general, AY)

538-K. The Origin and Distribution of Hydrogen in Steel Weld Metal. E. J. Millett. *British Welding Journal,* v. 3, Oct. 1956, p. 497-509.

Conditions necessary for the experimental determination of the segregation of hydrogen in weld metal are deduced and suitable apparatus described. (K9, ST)

539-K. Determining the Size and Rating of Resistance Welding Machines. H. Kocher and E. Weber. *Brown Boveri Review,* v. 43, no. 7, July 1956, p. 266-271.

Effect of weld quality on dimensioning of machine. Fundamental quantities are electrode pressure, welding current and time. Effect of weld quality on normal and peak load. Power consumption of various designs. (K3)

540-K. Welding Heavy Sections. H. J. Nichols. *Canadian Metals,* v. 19, Oct. 1956, p. 30-32.

Structural problems, preheating, automatic and semi-automatic welding, filler wire and flux, substitutes for peening. (K1, AY)

541-K. Power Hand Grinder Sparks New Soldering Technique. *Canadian Metals,* v. 19, Oct. 1956, p. 34, 36.

New technique makes possible the soldering of materials like glass, aluminum, stainless steel and ceramics and is expected to replace the more expensive ultrasonic method. (K7)

542-K. Developments in Mechanized Welding in the Aero-Engine Industry. F. G. C. Sandiford. *Institution of Mechanical Engineers, Proceedings,* v. 170, no. 4, 1953, p. 157-183 + 4 plates.

Illustrated review of a wide range of applications of fusion and resistance welding in current use. (K1, K3)

543-K. Weld Stronger Joints in Low-Alloy Steels. R. D. Libert. *Iron Age,* v. 178, Oct. 18, 1956, p. 135-138.

Flash welding experiments with selected high-strength steels heat treated to 280,000-psi. levels. (K3, AY)

544-K. Large-Scale Welded Assemblies. R. H. Warring. *Machinery Lloyd (Overseas Ed.),* v. 28, Oct. 13, 1956, p. 81-83.

Special techniques and equipment used in fabricating the largest aircraft wing tanks ever constructed. Electrical resistance welding was the principal joining method. (K3)

545-K. How to Weld Aluminum. Charles Bruno. *Modern Metals,* v. 12, Oct. 1956, p. 38, 40, 42.

Welding processes, welding characteristics of alloys, temperature requirements, design of fixtures, weld penetration, and other factors. (K1, Al)

546-K. Problems Involved in Spot Welding Titanium to Other Metals. Frank W. McBee, Jimmy Henson and L. R. Benson. *Welding Journal,* v. 35, Oct. 1956, p. 481s-487s.

Properties and problems of spot welding commercially pure titanium to stainless steel and several other metals. General information concerning the nature of these welds. (K3, SS, Ti)

547-K. Fabrication and Welding of Arc-Cast Molybdenum. R. E. Monroe, N. E. Weare and D. C. Martin. *Welding Journal,* v. 35, Oct. 1956, p. 488s-498s.

The effects of variation in composition and fabrication procedures on the ductility of fusion weldments

studied for titanium-neutralized and carbon-deoxidized molybdenum. (K1, Q23, Mo)

548-K. Thermal Stability of Cold Butt Welds in Copper and Aluminum. W. H. Bruckner and J. H. Sayles. *Welding Journal,* v. 35, Oct. 1956, p. 501s-505s.

Surveys properties of cold welds and indicates the conditions under which these welds have the most useful application. (K5, Q general, Cu, Al)

549-K. Wettability of Steel With Pure Silver and Various Silver-Brazing Alloys. Nikolajs Bredzs. *Welding Journal,* v. 35, Oct. 1956, p. 508s-520s.

Experimental program with silver alloys containing strong deoxidizers indicates new possibilities for development of self-fluxing, airproof brazing alloys. (K8, Ag)

550-K. Fusion Welding Zirconium for a Nuclear Reactor. Bruce L. Baird. *Welding Journal,* v. 35, Oct. 1956, p. 1007-1014.

Study indicated that weld bead porosity can be caused by poor joint cleaning, but not poor inert-gas shielding. Welds equal in ductility to the base metal can be made using the proper combination of inert-gas shielding and chill. (K1, Zr)

551-K. Portable Reactor Has Welded Gold Lining. *Canadian Metals,* v. 19, Oct. 1956, p. 26-28.

Gold is used to make lining for stainless steel reactor fuel tank. Wooden axe handle is used to form the gold shell. (K1, T25, Au)

552-K. Use Resistance Welding for Ultra-Thin Stainless Tubing. *Industry & Welding,* v. 29, Nov. 1956, p. 65-66.

New resistance welding techniques developed for fabricating 0.002-in. thick stainless steel for aircraft heat insulators. (K3, SS)

553-K. Mig Process and Cutting Unit Weld Irregularly-Shaped Joints. *Welding Engineer,* v. 41, Nov. 1956, p. 54-56.

Welding gun, weld metal deposition, magnetic follower, drive pulleys, craters, hot shortness, tolerances, structural changes. (K1)

544-K. (Russian.) **Near-Seam Cracks and Mechanical Properties of Welded Electro-Slag Joints in Medium Alloy Steels.** A. M. Makara, V. F. Grabin and I. V. Novikov. *Avtomaticheskaia Svarka,* v. 9, no. 4, July-Aug. 1956, p. 1-21.

Avoiding cracks in the welded steel seam by slag-welding to obtain joints of high mechanical properties. (K1, ST)

555-K. (Russian.) **Certain Metallurgical Peculiarities of Electro-Slag Welding.** D. A. Dudko and I. N. Rublevskii. *Avtomaticheskaia Svarka,* v. 9, no. 4, July-Aug. 1956, p. 22-29.

Transfer of carbon, manganese, silicon and phosphorus from the electrode wire; effect of atmospheric oxygen. (K1, ST)

556-K. (Russian.) **Fluxes for Electro-Slag Welding.** V. V. Podgaetskii. *Avtomaticheskaia Svarka,* v. 9, no. 4, July-Aug. 1956, p. 30-49.

Chemical composition, electroconductivity and viscosity of proposed slags. (K1, ST)

557-K. (Russian.) **Application of Radioactive Isotopes for Control of the Metal Bath in Electro-Slag Welding.** Iu. D. Gupalo, B. A. Movchan and R. M. Shirokovskii. *Avtomaticheskaia Svarka,* v. 9, no. 4, July-Aug. 1956, p. 67-69.

Scheme and method of application. (K1, S19, ST)

558-K (Russian.) **Contact-Slag Welding of Large Cross-Sections.** D. A. Dudko and I. K. Pokhodnia. *Avtomaticheskaia Svarka,* v. 9, no. 4, July-Aug. 1956, p. 70-75.

New simple, high-productive method for cross sections of 10,000 to 20,000 sq. mm. using a low power generator. (K1, ST)

559-K. (Russian.) **Contact Welding of Piping for Boilers of Especially High Characteristics.** A. S. Gel'man and E. S. Slepak. *Metallovedenie i Obrabotka Metallov,* no. 9, Sept. 1956, p. 41-49.

Data on welding for super-high-pressure boilers. Welding of pipe of austenitic steel; welding to pipe of pearlitic steel. (K3, AY)

560-K. (Russian.) **Some Technological Aspects of Automatic Flux-Shielded Welding of Lap-Joined Sheets 2.5 to 6 Mm. Thick.** A. G. Mazel and N. A. Sluchanko. *Stroitelstvo Predpriiatii Neftianoi Promyshlennosti,* v. 1, no. 7, Sept. 1956, p. 14-16.

Experimental data and theoretical considerations on the optimum procedures for arc welding lap-joined sheets with direct current, reverse polarity. (K1, ST)

SECTION L

CLEANING, COATING and FINISHING

1-L. How to Finish Stainless Steel. Richard E. Paret. *American Machinist,* v. 99, Nov. 7, 1955, p. 129-144.

Producing various degrees of finish by abrasion and electrochemical methods, also covers etching, pickling, decorative finishing processes. Photographs, tables. (L general, SS)

2-L. Evaluating Physical Properties of Coatings. J. I. Richardson. *Chemical Engineering,* v. 62, Nov. 1955, p. 242, 244, 248.

A coating, in addition to supplying chemical resistance, must also meet standards of permeability, thickness, adhesion, flexibility and abrasion. Photographs. (L general, S general)

3-L. Bitumen in the Prevention and Control of Corrosion. I. R. P. Bell and K. A. Wheeldon. *Corrosion Prevention and Control,* v. 2, Oct. 1955, p. 30-34.

Definition, origin, properties, classification and method of producing bitumen. Photographs. (To be continued.) (L26, ST, Fe)

4-L. Bituminous Products. *Corrosion Prevention and Control,* v. 2, Oct. 1955, p. 35-39, 64.

Review of anticorrosive coatings and compounds. Photographs. (L26, ST, Fe)

5-L. Chromium Impregnation for Corrosion Resistance and Heat Protection. *Electrical Manufacturing,* v. 56, Nov. 1955, p. 150-152.

Superior properties and lower costs make surface diffusion of chromium compete, in many applications, with stainless steel, chromium or nickel plating. Micrograph, photographs. (L15, Cr)

6-L. Some Properties of Tin (II) Sulfate Solutions and Their Role in Electrodeposition of Tin. III. Solutions With Tin (II) Sulfate, Sulfuric Acid, and Addition Agents. C. A. Discher. *Electrochemical Society, Journal,* v. 102, Nov. 1955, p. 617-622.

Cathode deposit obtained is clearly related to the surface tension, molar refraction, van't Hoff's *i,* and equivalent conductance of the solution. In terms of the cathode process, the data indicate that increased polarization favors better deposits. Graphs, diagrams, table. 7 ref. (L17, Sn)

7-L. Electrodeposition of Titanium on Base Metals. M. E. Sibert and M. A. Steinberg. *Electrochemical Society, Journal,* v. 102, Nov. 1955, p. 641-647.

A rapid, inexpensive process whereby thin layers are bonded to steel or other base metals by fused salt electrolysis. Using high currents and voltages with small amounts of titanium, the layer completely protects the coated article with all the corrosion resistance properties of titanium itself, and is firmly bonded by an alloy interface. Tables, photographs, micrographs. 10 ref. (L17, Ti)

8-L. The Kinetics of Formation of Anodic Ta_2O_5—Further Studies. D. A. Vermilyea. *Electrochemical Society, Journal,* v. 102, Nov. 1955, p. 655-659.

New data show that the activation energy for the process is not a single linear function of the applied electric field, and that the preexponential factor is also a function of the applied field. Graphs, table. 7 ref. (L19, Ta)

9-L. Surface Contamination of Copper by Phosphate Ion During Electropolishing Use of P^{32}. N. H. Simpson and Norman Hackerman. *Electrochemical Society, Journal,* v. 102, Nov. 1955, p. 660-661.

Since oxidation occurs in boiling water system, an optimum condition for removal of phosphate is shown. (L13, R2, P, Cu)

10-L. Electrolytic Processes for Surface Conditioning of Metals. J. W. Cuthbertson. *Institution of Electrical Engineers, Proceedings,* v. 102, pt. A, no. 5, Oct. 1955, p. 501-509.

Surface cleaning, descaling and finishing of metal and improving resistance of aluminum and its alloys to oxidation and abrasion. Diagrams. 29 ref. (L13, L19, Al)

11-L. Chemical and Anodic Treatments. V. F. Henley. *Light Metals,* v. 18, Oct. 1955, p. 347-348.

Critical review of British patents dealing with surface treatment of aluminum. (To be continued.) (L general, Al)

12-L. The Structure of Electrodeposited Metals. Rolf Weil and Harold J. Read. *Metal Finishing,* v. 53, Nov. 1955, p. 60-65.

Effect of plating variables on the structure by studying the surfaces with an electron microscope. Micrographs, table. (To be continued.) (L17, M27)

13-L. Continuous Hot Galvanizing of Strips. Nelson E. Cook. *Metal Finishing,* v. 53, Nov. 1955, p. 67-69; 73.

Advanced techniques for tight coating. Photographs. (L16, ST)

14-L. Electroplating on Porous Metal. J. B. Mohler. *Metal Finishing,* v. 53, Nov. 1955, p. 70-73.

Problems of plating, process, and appearance, some corrective steps. Powder metal parts also discussed. Diagrams, tables, micrographs. 6 ref. (L17, H general)

15-L. Surface Treatment and Finishing of Light Metals. VII. Industrial Anodizing of Aluminum and Its Alloys. S. Wernick and R. Pinner. *Metal Finishing,* v. 53, Nov. 1955, p. 74-77.

Discusses oxalic, sulfamic and phosphoric acid and Peintal processes, opaque and barrier coatings. Graphs. 14 ref. (L19, Al, EG-a)

16-L. Science for Electroplaters. VIII. Solutions. L. Serota. *Metal Finishing,* v. 53, Nov. 1955, p. 78-81.

Basic terms and processes used. Graphs, table. (L17)

17-L. Vitreous Enamel Coatings on Light Metals. F. J. Biechler and J. J. Meynis de Paulin. *Metal Industry,* v. 87, Oct. 7, 1955, p. 303-305.

Low melting point, high coefficient of thermal expansion, resistance to action of water, hardness, absence of corrosion on light metal surface and bright gloss retained under wide range of conditions. Tables. (L27, EG-a)

18-L. Automatic Rinsing Control. J. B. Mohler. *Metal Industry,* v. 87, Oct. 21, 1955, p. 343-346.

Because of water shortages and costs, controlled flow, fog and spray rinses, multiple rinsing and automatic control have been tried in electroplating lines to reduce soluble chemicals on work. Graphs, diagrams, tables, photograph. 4 ref. (L17, S18)

19-L. Mold Making by Electroforming. S. Fialkoff. *Plastics Technology,* v. 1, Oct. 1955, p. 542-544, 559.

Intricate molds are reproducible and have interior finishes that do not require further polishing. Photographs, diagram. (L18)

20-L. A Strip Coating Line for High Production Painting of Coil Stock. Roland Harrison. *Products Finishing,* v. 20, Nov. 1955, p. 34-39.

Roller coating unit applies paint to both sides of coil stock simultaneously. Photographs, diagrams. (L26, Al)

21-L. Tiny Electronic Parts Tumbled to Precision Finishes. A. W. Kollosch. *Products Finishing,* v. 20, Nov. 1955, p. 82-86.

Estimates tolerances, lists steps of correct tumbler loading, discusses general run and quality control. Photographs. (L10)

22-L. (German.) **Present Position of Flame-Spray Technique and Fluidization Sintering.** E. Gemmer. *Chemie-Ingenieur-Technik,* v. 27, no. 10, Oct. 1955, p. 599-600.

Both methods are used to provide corrosion resistant insulating and abrasion proof coats of plastics on metals or other basic materials. Diagrams, graphs, photograph. (L26)

23-L. (German.) **State of Steel Surface After Application of Various Rust and Scale-Removing Procedures.** F. Nieth. *Metalloberfläche,* Ausgabe A. v. 9, no. 10, Oct. 1955, p. 174-178.

Compares existent methods of rust and scale removing with flame method. Micrographs, graphs, table. 6 ref. (L10)

24-L. (German.) **Formation of Electrodeposits of Alloys. IX. Silver-Thallium Alloys.** Ernst Raub and Fritz Sautter. *Metalloberfläche,* Ausgabe B, v. 9, no. 10, Oct. 1955, p. 145-147.

Potential measurements in silver baths with and without thallium salts. Relation between thallium content of deposits and current density. Hardness and structure of deposits. Graphs. 5 ref. (L17, Ag, Tl)

25-L. (German.) **Influence of Material Shape on Chemical Polishing of Chromium-Nickel Steels.** Arvid v. Krusenstjern and Hans Schlegel. *Metalloberfläche*, Ausgabe B, v. 9, no. 10, Oct. 1955, p. 148-151.

Relation between item shape and gloss determined by means of a gloss-measuring device and microphotography. Photographs, diagrams, table, micrographs. 2 ref. (L12, SS)

26-L. (Russian.) **Protecting Stainless Steels From Corrosion by Anodic Polarization.** N. D. Tomashov and G. P. Chernova. *Doklady akademii nauk SSSR*, v. 104, no. 1, Sept. 1, 1955, p. 104-107.

Anodic polarization curves of chromium-nickel steels in various sulfuric acid concentrations at 25° C. Effectiveness of anodic oxide coating against corrosion. Table, graphs. 10 ref. (L19, SS)

27-L. (Russian.) **Electrochemical Method of Removing Zinc From Zinc-Coated Iron.** N. P. Fedot'ev and G. G. Khad'mash. *Zhurnal prikladnoi khimii*, v. 28, no. 10, Oct. 1955, p. 1104-1112.

In the alkaline corrosion of zinc an accelerating effect of the iron surface on dissolving the zinc from the coated iron was observed, indicating the necessity of working with insoluble anodes. A simple method of removing zinc consists of treating the sections in a sodium hydroxide solution, removing the iron, extracting the zinc by electrolysis with an insoluble anode, and remelting the cathodic deposits. Tables, graphs, photograph. 10 ref. (L13, Zn, Fe)

28-L. Protection of Low-Strategic Alloys With a Chromium-Boron-Nickel Cermet Coating. D. G. Moore and J. R. Cuthill. *American Ceramic Society Bulletin*, v. 34, Nov. 1955, p. 375-382.

In using ceramic coating techniques, the novel feature of the process is the fluxing action of the frit admixture which permits welding of the cermet particles to occur during firing without highly purified, oxygen-free atmosphere. Photographs, micrographs, tables. 8 ref. (L27, Cr, B, Ni)

29-L. Fabrication and Evaluation of Thin Clad Sheets of Molybdenum. M. H. LaChance and R. I. Jaffee. *American Society for Metals, Transactions*, v. 48, *Preprint No.* 43, 1955, 34 p.

System of cladding molybdenum with a base coat of nickel alloy, either in vacuum or by electroplating, for service up to 2000° F. An edge-cladding system is also described. Graphs, micrographs, tables. 6 ref. (L22, Mo)

30-L. Continuous Processing of Steel Strip. J. B. Mohler. *Automation*, v. 2, Dec. 1955, p. 37-43.

Various automation problems and their solutions. Photographs, diagrams. (L17, A5)

31-L. Phosphatizing Auto Bodies at Chrysler. Gilbert C. Close. *Finish*, v. 12, Dec. 1955, p. 46-47, 90.

Equipment and operation of production-line processing 800 auto bodies in two 8-hr. shifts. Photographs. (L14)

32-L. Lacquers, Synthetic Enamel Coatings and Stoving Finishes. A. A. B. Harvey. *Industrial Finishing (London)*, v. 9, Oct. 1955, p. 143-145.

General description of automotive finishing. Photographs. (L26)

33-L. The Adhesion of Vacuum-Evaporated Metal Films. F. C. Weil. *Institute of Metal Finishing, Bulletin*, v. 5, Autumn 1955, p. 169-176.

Technique for vacuum evaporation of metals and alloys, mechanism of formation of evaporated film on metallic or nonmetallic surfaces. Factors making for good and bad adhesion. 3 ref. (L25)

34-L. Proper Rinsing Practice Curbs Pinpoint Corrosion. L. J. Brown, Samuel Spring and W. J. Hennessey. *Iron Age*, v. 176, Dec. 1, 1955, p. 110-114.

Pinpoint rusting of cold rolled steel can be influenced by rinse water composition. Rinsing off offending ions with distilled water or steam condensate will prevent this form of corrosion. Maps, photographs, tables. 4 ref. (L12, CN)

35-L. Phosphating Etch Primers. Régine Bourbon and Jean-Jacques Meynis de Paulin. *Metal Industry*, v. 87, Sov. 18, 1955, p. 424-427.

Tests of coatings on aluminum alloys, including resistance to water and ultra-violet light. Photographs, tables. (L26, L14, Al)

36-L. Deposition of Silver From Solutions of Simple Silver Salts. H. Heiling. *Henry Brtucher Translation No.* 3580, 25 p. (From *Metall*, v. 8, nos. 11-12, 1954, p. 438-448.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 589-L, 1954. (L17, Ag)

37-L. Quality Indexes for Electroplating Installations. W. Nohse. *Henry Brutcher Translation No.* 3586, 13 p. (From *Metallwaren-Industrie und Galvanotechnik*, v. 45, no. 11,

1954, p. 527-533.) Henry Brutcher, Altadena, Calif.

Suggests practical data that should go with new equipment and how the customer can evaluate his purchase. Quality indexes as to performance. Diagrams. (L17)

38-L. Leveling Power of Electroplating Baths. *Henry Brutcher Translation No.* 3587, 13 p. (From *Metallic bulletin (Holland),* v. 3, no. 10, 1954, p. 233-242; no. 11, p. 261-263.) Henry Brutcher, Altadena, Calif.

Data on leveling power of Dutch and American proprietary nickel and copper plating baths. Micrographs. (L17, Cu, Ni)

39-L. (Russian.) **Physico-Chemical Basis for Diffusion Coating Formation on the Surface of Iron and its Alloys.** N. S. Gorbunov. *Izvsetiia akademii nauk SSSR, otdelenie khimicheskikh nauk,* 1955, no. 5, Sept.-Oct., p. 793-799.

Data on diffusion coatings, from elements of groups I through VII of the periodic system, include atomic diameters in angstroms and solubility of a given element in iron at room and high temperatures. Factors making formation of diffusion coatings possible include closeness of types of crystal lattices of element applied and of iron, and smaller atomic diameter of diffusing element. Tables, graph. 11 ref. (L15, M26, Fe)

40-L. Potential Measurements of Aluminum-Clad Uranium Systems. Arch B. Tripler, Jr., John G. Beach and Charles L. Faust. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* BMI-997, May 1955, 8 p.

Experimental data support the fact that uranium corrodes faster when coupled to nickel and aluminum than when coupled to AlSi and aluminum. (L22, R1, U)

41-L. The Painting of Structural Steelwork. *Corrosion Technology,* v. 2, Nov. 1955, p. 341-342.

Ten-year investigation results involving priming paints, protective paints based on tars and bitumens, metallic coatings, and methods of surface preparation. Photographs. (L26, ST)

42-L. Factors Affecting the Formation of Anodic Oxide Coatings in Sulfuric Acid Electrolytes. Ralph B. Mason. *Electrochemical Society, Journal,* v. 102, Dec. 1955, p. 671-675.

Amount of sulfate on pure aluminum increased as the current density and concentration of acid increased, but decreased as the temperature was raised. Graphs, tables. 5 ref. (L19, Al)

43-L. Properties and Uses of Heavy Nickel Deposits. J. W. Oswald. *Electroplating and Metal Finishing,* v. 8, Nov. 1955, p. 379-383.

Plating solutions, adhesion requirements, finishing and resulting properties, corrosion aspects, applications, comparison with other methods of surface finishing. Diagram, graphs, photographs, tables. 5 ref. (L17, R general, Ni)

44-L. The Use of Heat in the Application of Organic Finishes. J. N. E. Fairrie. *Electroplating and Metal Finishing,* v. 8, Nov. 1955, p. 389-394.

Hot spray process and equipment. Tables, photographs. 4 ref. (L26)

45-L. Determination of Correct Baking Procedures for Enamelled Wires. L. Kolar. *Engineers' Digest,* v. 16, Oct. 1955, p. 477-478. (Translated from *Elektrotechnicky Obzor,* v. 44, no. 4, 1955, p. 181-186.)

Correct degree of baking determined by testing and correlating test results of the dielectric constant, enamel resilience during reeling, thermal shock, and mechanical and electrical properties under torsion. Graphs, table. (L26)

46-L. Oxide and Silicon Carbide Coatings for High Temperature Resistance. *Industrial Heating,* v. 22, Nov. 1955, p. 2352 + 4 pages.

Coatings protect the base material against erosion and provide thermal insulation; oxides are sprayed on the base metal in a molten condition. Diagram, photographs, tables. (L14, L26)

47-L. The B.N.F. Jet-Test on Organic Bright Nickel Deposits. J. Edwards. *Institute of Metal Finishing, Transactions,* v. 30, 1954, p. 17-30.

Rate of penetration of organic bright nickel deposits in the B.N.F. jet-test shown to vary with the thickness of deposit. Therefore, to determine thickness by this method it is necessary to use a calibration curve relating apparent and true thickness. Tables, graphs, diagrams. (L17, S14, Ni)

48-L. Electrodeposition and the Printing Trade. J. Riley. *Institute of Metal Finishing, Transactions,* v. 30, 1954, p. 61-76.

Printing processes, electrotyping, electro-deposition methods and equipment. Tables. 2 ref. (L17)

49-L. Some Aspects of Tinning by Immersion Processes. D. E. Weimer and J. W. Price. *Institute of Metal Finishing, Transactions,* v. 30, 1954, p. 95-108, disc. 109-111.

Tin coatings applied by chemical displacement on aluminum castings. Graphs, tables, 7 ref. (L16, Sn, Al)

50-L. Organic Protective and Decorative Coatings for Metal Containers. T. G. Green and M. Thomas. *Institute of Metal Finishing, Transactions,* v. 30, 1954, p. 112-121, disc., p. 122-123.

Composition properties and application techniques of lacquers for food cans. Diagram, photograph. 8 ref. (L26, Sn)

51-L. Phosphating. R. F. Drysdale. *Institute of Metal Finishing, Transactions,* v. 30, 1954, p. 124-139.

Review of methods, characterization of coatings applied by various techniques. 11 ref. (L14)

52-L. Stress in Electrodeposits. R. A. F. Hammond. *Institute of Metal Finishing, Transactions,* v. 30, 1954, p. 140-157.

Methods of measuring stresses, effects of electroplating variables on development of stresses in deposits. Diagrams, tables, graphs. 21 ref. (L17, Q25)

53-L. The Future of Electroplating. William Blum. *Institute of Metal Finishing, Transactions,* v. 30, 1954, p. 182-195, disc., p. 196-201.

Trends and outlook in research, metals to be coated, coating metals, electroplating techniques. (L17)

54-L. Precious Metal Plating: Uses Expand in Industry. P. J. Sloane and Isidore Cross. *Iron Age,* v. 176, Nov. 17, 1955, p. 120-123.

Precious metal plating is becoming important in industry as a low-cost method of achieving optimum serviceability. Thin deposits resist wear and retain their surface properties. Diagram, photographs. (L17, EG-c)

55-L. Coating on Polished Strip Saves Refinishing Costs. W. G. Patton. *Iron Age,* v. 176, Nov. 24, 1955, p. 83-85.

Spray coating is applied to strip before forming or stamping. Table, photographs. (L26)

56-L. Chemical and Anodic Treatments. V. F. Henley. *Light Metals,* v. 18, Nov. 1955, p. 368-369.

Critical review of British patents on chemical and anodic oxidation of aluminum, including after-treatment processes. (L14, L19, Al)

57-L. Quality Tests for Black Oxide Coatings on Steel. Jodie Doss. *Metal Finishing,* v. 53, Dec. 1955, p. 48-50, 56.

Thirteen types of steel were black-oxide treated in an aqueous alkaline oxidizing bath for various periods of time. A test using 5% oxalic acid solution was found to indicate the quality of the coating. Micrographs. (L14, S10, ST)

58-L. The Cr-22 Coating for Magnesium. Wm. McNeill. *Metal Finishing,* v. 53, Dec. 1955, p. 57-59.

New anodic coating combining short treatment time and low electrolyte coats with excellent protective properties. Micrographs. (L19, Mg)

59-L. Science for Electroplaters. IX. Solutions—Equations. L. Serota. *Metal Finishing,* v. 53, Dec. 1955, p. 66-68.

Basic equations. (L17)

60-L. Corrosion Protection of Magnesium Alloys. Maurice Hardouin. *Metal Industry,* v. 87, Nov. 4, 1955, p. 385-387.

Review of new methods evaluated alongside older, more conventional methods. Graphs. 3 ref. (To be continued.) (L general, Mg)

61-L. The Effect of Modifiers on the Chemical Resistance of Vinyl Films. *Official Digest. Federation of Paint and Varnish Production Clubs,* v. 27, Nov. 1955, p. 828-837.

Coatings of Vinylite VAGH with eight modifications tested on unprimed steel panels in seven different liquid systems. Aroclor 1254 is superior to others used. Graph, tables. (L26, R5, ST)

62-L. Beverage Can Linings. E. S. Beck. *Organic Finishing,* v. 16, Nov. 1955, p. 13-20.

Differences and similarities of construction, properties and testing of two can types. Diagram, photographs. (L26)

63-L. Electrodecontamination of Metals. John B. Huff. *Phillips Petroleum Co. (U. S. Atomic Energy Commission),* IDO 14352, Aug. 1955, 22 p.

Equipment and process. Photographs. 9 ref. (L13)

64-L. Now You Can Renew Worn Cylinders With Chromium. *Power Engineering,* v. 59, Dec. 1955, p. 64-66.

The Van der Horst Corp. has developed a porous chromium finish, as a cylinder lining material, which permits lubrication. Photographs, micrograph, table. (L17, Cr)

65-L. Zinc Coatings for Protecting Steel. Ernest W. Horvick. *Product Engineering,* v. 26, Dec. 1955, p. 158-161.

Five methods of applying zinc coatings and advantages or limitations of each. Photographs, tables. (L general, Zn, ST)

66-L. Brush Plating. Seymour Senderoff. *Products Finishing,* v. 20, Dec. 1955, p. 52 + 7 pages.

"Dalic" plating process, equip-

ment, methods, applications. Photographs, table, diagram. (L17)

67-L. Abrasive Blasts Scale From Carbon Strip. Gilbert D. Dill. *Steel,* v. 137, Nov. 28, 1955, p. 106-107.

Description and operation of line of equipment for cleaning hot rolled carbon steel strip by mechanical blast descaling and short flash-pickle. Photograph, diagram, table. (L10, L12, CN)

68-L. Cyanide Recovery Pays Double Dividend. *Steel,* v. 137, Nov. 28, 1955, p. 117, 120.

Recovery of zinc plating solution from rinse water is cheaper than chlorination treatment. Diagram. (L17, A8, Zn)

69-L. Studies on the Anodic Polarization of Zirconium. George B. Adams, Jr., Mario Maraghini, Tien-Shuey Lee and Pierre Van Ryssel-berghe. *University of Oregon (U. S. Atomic Energy Commission),* AECU-3058, July 1955, 35 p.

Studies on formation and properties of anodic oxide coatings on hafnium-free metal. Graphs, tables, circuit diagrams. 11 ref. (L19, Zr)

70-L. Thermodiffusional Sulfidizing of Steels. V. V. Gal'chenko. *Henry Brutcher Translation No.* 3595, 9 p. (From *Stanki i instrument,* v. 26, no. 2, 1955, p. 17-19.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 321-L, 1955. (L15, ST)

71-L. Joining and Finishing of Zirconium. VII. Surface Treatment and Cleaning. Paul Cohen. Paper from "The Metallurgy of Zirconium". National Nuclear Energy Series, Division VII—v. IV. McGraw-Hill Book Co., p. 334-337.

Methods and equipment for vapor blasting and pickling. Tables. (L10, L12, Zr)

72-L. Joining and Finishing of Zirconium. VIII. Plating. J. G. Beach. Paper from "The Metallurgy of Zirconium". National Nuclear Energy Series, Division VII—v. IV. McGraw-Hill Book Co., p. 337-347.

Preparation of electroplated and hot dip coatings on zirconium and the electrodeposition of zirconium on iron, nickel, molybdenum, titanium or zirconium alloys. Tables, micrographs. 39 ref. (L17, L16, Zr)

73-L. (French.) The Use of Oil Bitumen for the Protection of Underground Pipes. E. Leclerc and H. Goldstein. *Industrie Chimique Belge,* v. 20, no. 1, Jan. 1955, p. 19-27.

Characteristics, processes for control, examination of objections against the product. Diagrams. 13 ref. (L26)

74-L. (French.) Surface Treatment of Aluminum and Its Alloys. I. Mechanical Treatment. Mechanical Polishing. Charles Etienne and Francois Flusin. *Revue de l'aluminium,* v. 32, no. 224, Sept. 1955, p. 821-830.

Reviews buffing, dabbing, brightening, polishing machines and defects, parts design, alloy selection. Tables, diagrams, photographs. (To be continued.) (L10, Al)

75-L. (Russian.) Study of Chemically Active Coatings for Raising the Quality of Transformer Steel. N. I. Lapkin. *Fizika metallov i metallovedenie,* v. 1, no. 1, 1955, p. 185-192.

Composition, concentration, manner of drying potassium, sodium, magnesium and barium carbonate coatings; variation in specific losses, grain size and oxygen content in relation to content of coatings when annealing steel in hydrogen or in vacuum; effect of optimum chemically active coating and annealing temperature on magnetic properties of steel. Graphs, tables. 6 ref. (L14, P16, ST)

76-L. (Book.) Institute of Metal Finishing, Transactions (Annual Volume), v. 30, 1954, 207 p. Institute of Metal Finishing, 32, Great Ormond St., London, England.

Reports on organics, hot-dip, electroplate, and chemical coatings are abstracted separately. (L general)

77-L. Vacuum Metallizing—Modern Midas Touch. Robert N. Sheets and William M. Stocker, Jr. *American Machinist,* v. 99, Dec. 19, 1955, p. 105-108.

Use in manufacture of plastic toys, electronic equipment, automotive accessories, household appliances, business machines, decorative papers. Photographs. (L23)

78-L. Get the Most Out of Vapor Degreasing. Charles E. Kircher and T. J. Kearney. *Steel,* v. 137, Dec. 19, 1955, p. 92-93.

Criteria for selecting proper equipment and solvent for specific applications. Photographs, table. (L12)

79-L. No Acid in This Pickle Line. *Steel,* v. 137, Dec. 19, 1955, p. 96, 98.

Stainless and heat resisting steels turn bright after special salt bath and atmosphere heating. Working properties are comparable to acid-pickled alloys. Graph, table. (L12, ST)

80-L. The Protection of Structural Steel. Physical Examination of Paints in Relation to Their Practical Performance. H. W. Talen. *Chemistry & Industry,* 1955, no. 49, Dec. 3, p. 1564-1574.

Results of investigations relating to the effect of weathering on a number of paints. Diagrams, graphs, tables. 4 ref. (L26, R3, ST)

81-L. The Protection of Structural Steel. Long-Time Tests Carried Out by the Swedish Committee on Corrosion With Painted and Galvanized Steel Plates Exposed to Air. P. Nylén and K. F. Trägardh. *Chemistry & Industry,* 1955, no. 49, Dec. 3, p. 1574-1587.

Reports test methods and results, effects of methods of application, pretreatment and galvanizing procedures. Map, tables, micrographs, graphs. 3 ref. (L26, R3, ST)

82-L. Study of Copper Anodes in Acid and Cyanide Plating Baths. William H. Safranek and Charles L. Faust. *Plating,* v. 42, Dec. 1955, p. 1541-1546.

Utilizing high-purity cast anodes overcomes the disadvantage of electrolytic copper with respect to fastening hooks. The cast anodes dissolve uniformly and create less scrap, and are supplied in longer lengths. Particle roughness is reduced, and as a result diaphragms have been eliminated in some installations. Tables, graphs. (L17, Cu)

83-L. Liquid Honing as a Surface Conditioning Operation. William C. Ehlert, G. Kauffman and G. Burrett. *Plating,* v. 42, Dec. 1955, p. 1522-1524.

Equipment, methods, uses and advantages of liquid abrasive blasting. Photographs, maps. (L10)

84-L. Treatment of Anodizing Wastes by Ion Exchange. Lacern M. Corcoran. *Sewage and Industrial Wastes,* v. 27, Nov. 1955, p. 1259-1261.

Treatment by chemical and ion exchange methods. Ion exchange is more economical. Includes rinse water system. Photograph, table. (L19)

85-L. Diffused Nickel Cadmium as a Corrosion Preventive Plate for Jet Engine Parts. Ralph W. Moeller and William A. Snell. *Plating,* v. 42, Dec. 1955, p. 1537-1540.

Engineering application, on a production scale, of 0.0003-in. nickel plus 0.0001-in. cadmium, diffused at 630° F., for low alloy steel parts for engine parts operating at temperatures up to 1000° F. Micrographs, photographs. (L17, Cd)

86-L. Corrosion Protection of Magnesium Alloys. Maurice Hardouin. *Metal Industry,* v. 87, Nov. 11, 1955, p. 408-409.

Properties and application procedures for paints and primers. 1 ref. (L26, Mg)

87-L. Nickel-Plated Steel Sheet and Plate. L. L. Williams. *Materials & Methods,* v. 42, Nov. 1955, p. 112-114.

A new corrosion-resistant, workable material suitable for process equipment where product contamination is a factor. Photographs. (L17, L22, CN)

88-L. Fluorocarbon Dispersion Coatings. Gene Bartczak. *Materials & Methods,* v. 42, Nov. 1955, p. 90-95.

These coatings are finding acceptance in industry because of their unique chemical, physical and mechanical properties. Tables, photographs. (L16)

89-L. Electroplated Metals on Niobium. John G. Beach and C. L. Faust. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* BMI-1004, May 1955, 7 p.

Columbium was activated for adherent plating by electrolytic etching in a hydrofluoric acid solution. Arsenic-electroplated iron on columbium was difficult to pry off. Heat treatment after baking provides excellent bonds. Photographs. 4 ref. (L17, Cb)

90-L. (Czech.) Cladding of Thin Sheets With Stainless Steels. Josef Teindl. *Hutnik,* v. 5, no. 7, July 1955, p. 204-205.

To economize on nickel and chrominum, carbon steel sheet is clad with stainless steel. Heating, rolling, and welding steps in cladding. Tables, diagrams. (L22, SS, CN)

91-L. (Italian.) Copper Cementation With Beryllium. G. Venturello and V. Coen. *Metallurgia italiana,* v. 47, no. 10, Oct. 1955, p. 453-460.

Use of a copper-beryllium alloy coating on copper parts provides the electrical and thermal conductivity of copper with the hardness, wear resistance and scale-free properties of the copper-beryllium alloy. Graphs, table, maps, diagram. 11 ref. (L15, P15, P11, Q29, Q9, Cu, Be)

92-L. (French.) Electrolytic Deposits on Platinum Metals. E. H. Laister. *Revue de métallurgie,* v. 52, no. 9, Sept. 1955, p. 698-705.

Details of solutions and technique for platinum, palladium, and rhodium plating. Table. (L17, Pt, Pd, Rh)

93-L. (French.) The Electrochemical Behavior of Monocrystalline Surfaces. Electrochemical Deposition and Etching on the (0001) Face of Pure Zinc. L. Cavallaro and G. P. Bolognesi. *Revue de métallurgie,* v. 52, no. 9, Sept. 1955, p. 706-710.

Macroscopic and microscopic studies relate surface characteristics

with current density. Micrographs. 8 ref. (L17, M21, M28, Zn)

94-L. (German.) **Possibility of Utilization and Techniques of Anodic Polishing of Copper Alloys.** J. Elze. *Metall,* v. 9, nos. 21-22, Nov. 1955, p. 983-990.

Process is applicable to polishing, deburring, ridge removal and surface cleaning. Tables, graphs, photograph, micrographs. 3 ref. (L13, Cu)

95-L. (French and German.) **Cleaning by Ultra Sound.** F. Held. *Pro-Metal,* v. 7, no. 47, Oct. 1955, p. 564-569.

Cleaning methods, limitations in use of ultrasonics. Diagrams, table, micrographs, photographs, drawings. (L10)

96-L. New Chrome Finish Cuts Part Handling and Cleaning. T. P. McFarlane. *Iron Age,* v. 176, Dec. 1, 1955, p. 103-105.

"Crack-free" process incorporates a low-cost bath and requires no copper or nickel undercoating. Photographs. (L17, Cr, Zn)

97-L. The Protection of Structural Steel. L. A. Ravald. *Chemistry & Industry,* 1955, no. 48, Nov. 26, p. 1526-1535.

Removal of mill scale and metallizing in the pretreatment of steel; metal coatings and paint systems as protective methods. Table. 15 ref. (L12, L26, ST)

98-L. The Protection of Structural Steel. Principles of Protective Painting. G. Dechaux. *Chemistry & Industry,* 1955, no. 48, Nov. 26, p. 1535-1541.

Corrosion of metal structures exposed to the weather and sea water; comparison of polished unpainted steel, rough unpainted steel and painted steel; formulation and appraisal of the efficiency of anticorrosive paints. Diagram, graphs, micrographs. 12 ref. (L26, R3, R4, ST)

99-L. Hydrogen Contamination in Descaling and Acid Pickling of Titanium. G. A. Lenning, C. M. Craighead and R. I. Jaffee. *American Society for Metals, Transactions,* v. 48, *Preprint No.* 33, 1955, 10 p.

Increased ratio of surface area to mass and increased bath time will cause an increase in hydrogen absorption by titanium. In Virgo bath, no hydrogen pickup occurred, but surface pitting was evidenced. Tables. 4 ref. (L12, Ti)

100-L. The Protection of Structural Steel. I-II. Practical Experience of Protection by Sprayed Metal Coatings. W. E. Ballard and F. A. Rivett. *Chemistry & Industry,* 1955, no. 50, Dec. 10, p. 1606-1615.

Techniques of applying zinc and aluminum coatings for maximum possible protection. Photographs, table. (L23, Al, Zn)

101-L. The Protection of Structural Steel. The Use and Weldability of Aluminum Sprayed Steel. H. F. Tremlett and W. A. Johnson. *Chemistry & Industry,* 1955, no. 50, Dec. 10, p. 1616-1617.

Precautions necessary with aluminum-coated steels in regard to welding operations. Table. 4 ref. (L23, K9, ST)

102-L. The Protection of Structural Steel. The Protection of Steelwork in Chemical Factories. F. R. Himsworth. *Chemistry & Industry,* 1955, no. 50, Dec. 10, p. 1618-1622.

Considers painting, sprayed metal coatings and other forms of protection and economic considerations involved. Table. (L26, L23, ST)

103-L. Continuous Anodic Oxidation of Copper Wire. Dallas T. Hurd, James G. Krieble and H. G. Pfeiffer. *Industrial and Engineering Chemistry,* v. 47, Dec. 1955, p. 2483-2491.

Black copper oxide applied to copper wire, by continuous electrolytic oxidation in hot alkaline solution, appears to meet all requirements of a good barrier substrate for the higher operating temperatures of electrical apparatus. Diagrams, graphs, table, photographs. 6 ref. (L19, Cu)

104-L. Metallic Coatings on Non-Metallic Materials. IV. Vacuum Coating Methods. *Industrial Finishing (London),* v. 9, Oct. 1955, p. 160, 162.

Three basic techniques and equipment required. Photographs, table. (L25)

105-L. Electrodeposition of Tin and Tin Alloys. R. M. Angles. *Industrial Finishing (London),* v. 9, Nov. 1955, p. 202 + 5 pages.

Uses of tin and its applications in the preparation of alloys, its usefulness as a protective coating in industry. Diagram, photographs, table. (L17, Sn)

106-L. Metallic Coatings on Non-Metallic Materials. V. Metallic Paints. *Industrial Finishing (London),* v. 9, Nov. 1955, p. 214, 216, 218, 220.

Methods of metallizing glass, ceramics and similar materials. Considers way in which application and firing of metallic paints have been stimulated by the development of new uses in radio and electronics. Table. (L23)

107-L. Bituminous Paints Prove Their Worth by Achieving a High Waterproof Finish. *Industrial Finishing (London),* v. 9, Nov. 1955, p. 228, 230.

Includes micrographs, photograph. 1 ref. (L26)

108-L. Barrel Plating Setup Combines High Output With Versatility. G. W. Harding. *Iron Age,* v. 176, Dec. 29, 1955, p. 65-67.

New plating system alters thicknesses every 15 min. by an automatic device. It handles batch-load specifications up to 20,000 lb. hourly. Photographs. (L17, Zn)

109-L. Lacquer or Enamel? John B. Campell. *Materials & Methods,* v. 42, Dec. 1955, p. 88-92.

Choice of finish will significantly affect unit costs and performance quality. Photographs, graph. 12 ref. (L26)

110-L. Sprayed Metal Coatings in Product Design. D. A. Watson. *Materials & Methods,* v. 42, Dec. 1955, p. 106-109.

Metallizing is now finding uses in original product manufacture for wear resistance, solderability and corrosion resistance. Photographs, tables. (L23, K7, SS, AY, CI, Fe, Al, Cu, Zn, Mo)

111-L. The Heat Resistance and Applications of Hot Dip Aluminized Steel. M. L. Hughes and D. F. G. Thomas. *Metallurgia,* v. 52, no. 313, Nov. 1955, p. 241-245.

Procedure and results of heat and scaling resistance tests using steel prepared by the Aldip process. (L16, Al, ST)

112-L. A Working Guide to Selecting and Applying Surface Protection for Die Castings. *Precision Metal Molding,* v. 13, Dec. 1955, p. 66-70, 72.

Specific types and characteristics of chemical and electrolytic coatings. Table, photographs. (L14, L17)

113-L. Some Successful Applications of Electrolytic Polishing in Industry. R. Mondon. *Sheet Metal Industries,* v. 32, no. 344, Dec. 1955, p. 923-931, 934.

Properties of electrolytically polished metal surfaces; applications of process to various production problems. Micrographs, photographs, diagrams, graphs. 12 ref. (L13, Fe, Ni-g, ST)

114-L. Hot-Tinning Cast Iron. C. J. Thwaites. *Tin and Its Uses,* 1955, no. 33, p. 5-6.

Direct chloride method developed for certain high-phosphorus irons found not to be amenable to tinning by the fused chloride salt-bath method due to their susceptibility to over-treatment. It has since been found to be generally applicable to gray cast irons and has been used successfully for Meehanite and spheroidal graphite irons. Photograph. (L16, CI, Sn)

115-L. Tin Alloy Coatings as Alternatives to Nickel-Chromium. S. C. Britton. *Tin and Its Uses,* 1955, no. 33, p. 10-12.

Reports results obtained in extensive exposure trials carried out by Tin Research Institute. Micrographs. (L17, Sn, Cu, Ni, Cr, ST)

116-L. (English.) **Studies on the Growth, Form, and Structure of Electrodeposited Metals.** Gösta Wranglén. *Svensk kemisk tidskrift,* v. 67, no. 10, 1955, p. 463-471.

Dendrite growth, throwing power, metal powder electrodeposition, structure of electrodeposited iron. Table, diagrams, photographs, micrographs. (L17, M27, Fe)

117-L. (Czech.) **Metallurgical Remarks on the Production and the Use of Preserve Tins.** Josef Teindl and Dagmar Zajoncova. *Hutnické listy,* v. 10, no. 11, Nov. 1955, p. 654-662.

Factors causing defects in tin cans, including coating, thickness variation, metal purity, desire to conserve tin supplies, soldering. Dependence of coating adherence on iron-tin intermediate layer. Diagrams, tables, micrographs. 23 ref. (L16, T10, Sn)

118-L. (French and German.) **Chemical and Electrolytic Polishing of Surfaces.** P. Grivel. *Pro-Metal,* v. 7, no. 47, Oct. 1955, p. 570-579.

Critical review of methods and their applications. Tables, diagrams, photographs, drawings. 9 ref. (L12, L13)

119-L. (French.) **Continuous Anodizing as Applied to Aluminum Wire.** N. D. Pullen. *Revue de métallurgie,* v. 52, no. 9, Sept. 1955, p. 731-734.

Necessity for specifications to control quality in this high-speed operation. Photograph. (L19, Al)

120-L. (Russian.) **Study of Corrosion Stability and Wear Resistance of Calorized Steel.** S. G. Bogdanov. *Metallovedenie i obrabotka metallov,* 1955, no. 3, Sept., p. 25-31.

Experimental investigation of corrosion resistance of the calorized surface in acids, salt water vapors and oxidizing atmosphere at high temperatures. Wear resistance of calorized surface investigated by friction with steel. Graphs, tables, diagrams, photographs. 2 ref. (L15, R5, R3, Q9, ST)

121-L. (Russian.) **Electropolishing in Oxalic Acid Electrolytes.** D. V. Pletnev. *Vestnik mashinostroeniia,* v. 35, no. 11, Nov. 1955, p. 58.

Use of oxalic acid electrolytes for electropolishing, comparison with other type reagents. Composition and optimal working ratio. (L13)

122-L. (Russian.) **Criterion on Evenness of Metal Distribution on the Cathode.** L. I. Kadaner. *Zhurnal prikladnoi khimii,* v. 28, no. 11, Nov. 1955, p. 1174-1178.

Effect of interelectrode distance on current density; polarizability of cathode. Diagram. 9 ref. (L17, Cr, Ni)

123-L. (Russian.) **Ferrocyanide Electrolyte for Silvering.** V. I. Semeriuk. *Zhurnal prikladnoi khimii,* v. 28, no. 11, Nov. 1955, p. 1240-1242.

Silver deposits are dense, finely crystalline, easily polished and cling well to base metal of copper and brass. This electrolyte also permits thick depositions of 30μ and more without intermediate roughing. 3 ref. (L17, Ag)

124-L. (Spanish.) **Metallization.** Salvador Maria Checa Casajus. *Instituto del hierro y del acero,* v. 8, no. 38, July-Sept. 1955, p. 374-383.

Equipment, methods of surface preparation, metallization process, mechanical properties of coatings, applications and defects. Diagrams, photographs, micrographs, table. 8 ref. (L23, Al, Cu, Ni, ST, Zn)

125-L. The Deposition of Thin Films of Gold on Cylindrical Specimens by Sputtering. F. R. Lipsett. *British Journal of Applied Physics,* v. 6, Dec. 1955, p. 442-444.

Apparatus and procedure for gold deposition on cadmium wires of 1 mm. diam. Diagram, table. 3 ref. (L25, Au)

126-L. Tentative Recommended Specifications and Practices for Coal Tar Coatings for Underground Use. *Corrosion,* v. 12, Jan. 1956, p. 75-76.

Coating requirements, coal tar primer and enamels applications of coal tar coatings to pipe. Table. (L26, S22)

127-L. Nickel Plating by Direct Chemical Deposition. *Corrosion Technology,* v. 2, Dec. 1955, p. 377-379.

A more flexible and direct method of plating by chemical deposition from appropriate solutions. Its main features are superior corrosion resistance to normal electroplating and extreme simplicity, since no electrical equipment is needed; however, it is not quite as economical as electroplating. Photograph. 9 ref. (L14, L17, Ni)

128-L. Electroless Nickel Plating and Its Applications. Bosdorf. *Electroplating and Metal Finishing,* v. 8, Dec. 1955, p. 415-417, 428.

Process in an acid and alkaline solution based on nickel chloride and sodium hypophosphite. Rate of deposition is a function of time in both solutions; deposit thickness increases with increase in nickel or hypophosphite up to a limiting value. Tables, graphs, photographs, micrographs. 5 ref. (L14, Ni)

129-L. The Protective Value of Paints on Steel. *Electroplating and Metal Finishing,* v. 8, Dec. 1955, p. 426-428.

Tests were conducted on 250 paints in industrial and marine atmospheres. Covers priming paints, metallic pigments and lead soaps in primers, effect of surface preparation and metallic coatings on paint systems, tar and bitumen paints. (L26, ST)

130-L. Porcelain Enameled Aluminum. *Foote Prints,* v. 27, no. 2, 1955, p. 3-7.

Basic manufacturing principles, advantages, and uses. Photographs. (L27, T26, Al)

131-L. Use of Radio-Active Isotopes in the Study of the Permeability of Paint and Varnish Films. C. K. N. Nair, P. G. Sharma and J. S. Aggarwal. *Journal of Scientific & Industrial Research,* v. 14, sec. B, Nov. 1955, p. 549-552.

Radio-active tracers provide a convenient tool in evaluating paint and varnish compositions. Rubidium-86 was used to determine permeability of coatings by distilled and 'synthetic' sea water. Tables. 4 ref. (L26, S19, Rb)

132-L. Plating Room Layout. J. J. Martin, Jr. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 11 + 4 pages.

Basic equipment design and layout. (L17)

133-L. Plating Room Floor Construction. Robert S. Mercer. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 20, 22-25.

Base floor, impervious interlines, surface or protective sheathing and drainage. Diagram. (L17)

134-L. Mechanical Exhaust for Plating Rooms. B. F. Postman. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 25 + 11 pages.

General specifications for exhaust systems used in different plating room processes, exhaust system constituents. Diagram, graph. (L17, A5)

135-L. Essentials of Plating Rack Design. William E. Belke. *Metal Fin-*

ishing (Guidebook—Directory Ed.), 1956, p. 41 + 9 pages.

Primary factors to consider for specific applications in production plating. Diagrams, tables. (L17)

136-L. Electrical Power for Plating. I. Motor-Generators. II. Rectifiers. III. Plating Tank Wiring. William E. Schwarz, James A. Viola, William E. Bryan and Nathaniel Hall. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 54 + 14 pages.

Types of and controls for motors, generators and rectifiers, wiring systems. Diagrams, graphs, table. (L17)

137-L. Corrosion Resistant Tanks and Linings. Milton Nadel. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 77 + 6 pages.

Evaluates wood, plastic, glass, ceramic, concrete and steel for tanks, various linings for steel tanks. Table. (L general)

138-L. Heating Plating Solutions. G. B. Hogaboom, Jr. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 87-88.

Means for computing boiler horsepower needed to fill B.t.u. requirement of plating tank. Necessary tank coil dimensions and burner capacities presented in tabular form. 2 ref. (L17)

139-L. Cooling of Plating Solutions. Mary Rubinstein. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 90, 92-95.

Cooling methods and cooling calculations for baths. Tables. (L17)

140-L. Agitation of Plating Solutions. Mary Rubinstein. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 96-101.

Air and mechanical agitation, solution circulation, convection and ultrasonics with regards to materials and constituents used. (L17)

141-L. Polishing and Buffing. H. L. Kellner. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 117 + 9 pages.

Polishing materials and equipment, burring, brushing and buffing. Table. (L10)

142-L. Surface Finishing the Stainless Steels. Lester F. Spencer. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 136 + 7 pages.

Basic characteristics and types of stainless steels; commercial mill finishes. Table. (L10, G19, SS)

143-L. Abrasives and Compounds for Polishing and Buffing. Howard J. McAleer. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 148 + 6 pages.

Types of abrasive materials, buffing compounds and binders. (L10)

144-L. Abrasive Blasting. Victor F. Stine. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 157-165.

Impact blasting is used to replace pickling, electrochemical cleaning, hand finishing. Methods and equipment for applying abrasives with air and in liquid. (L10)

145-L. Barrel Finishing. Peter L. Veit. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 166 + 18 pages.

Brief history, terminology, theory, selection, conditioning and the size of media, barrel types, design, maintenance methods. Diagrams. (L10)

146-L. Solvent Vapor Degreasing. G. W. Walter. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 189-196.

Solvents, degreasing apparatus, degreasing cycles, operating methods, maintenance, testing and ultrasonic degreasing. Diagrams. (L12)

147-L. Solvent Recovery and Conservation. Max Randall. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 198, 200.

Methods for recovering solvents in a degreaser and in a still. Factors to consider in conserving the solvent. Table. (L12)

148-L. Metal Cleaning. S. Spring. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 200 + 11 pages.

Cleaning metals with chemical agents, particularly alkaline, in preparation for electroplating. Micrographs, table. (L12, L17)

149-L. Pickling and Acid Dipping. Nathaniel Hall. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 218-226.

Dip and/or pickling formulas for cadmium, iron, steel, silver, stainless steel, titanium and for aluminum, copper, magnesium, nickel, zinc, and their alloys. (L12, Cd, Fe, Ag, SS, Ti, Al, Cu, Mg, Ni, Zn)

150-L. Preparation of Basis Metals for Plating. Nathaniel Hall. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 226-234.

Cleaning, dipping, plating steps for steels, zinc die castings, aluminum, stereotypes, slush castings, leaded-brass and bronze, lead. (L17, L12, ST, Zn, Al, Cu, Pb)

151-L. Electroplating on Magnesium Alloys. Myron B. Diggin. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 243-249.

Surface conditioning, activating pickling, zinc immersion coating, copper striking, standard plating

constitute the basic steps required in magnesium plating. 2 ref. (L17, L12, Mg)

152-L. Cyanide Cadmium Plating. R. O. Hull. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 254, 256, 258.

Solution compositions, general operations, equipment, deposition rates. 5 ref. (L17, Cd)

153-L. Chromium Plating. George Dubpernell. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 260 + 6 pages.

Ornamental, industrial, high-speed, basket, barrel and porous chromium plate. Micrographs. (L17, Cr)

154-L. Acid Copper Plating. Louis Packman and A. T. Marinaro. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 272, 275-276.

Techniques that have proven successful in bright nickel plating are being applied to copper with excellent results but the inherent disadvantage of this type of solution is that steel and zinc parts require a strike or flash coating from a cyanide-type copper bath. (L17, Cu)

155-L. Cyanide Copper Plating. Barnet D. Ostrow and Fred I. Nobel. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 276 + 6 pages.

Includes tables. (L17, Cu)

156-L. Fluoborate Copper Plating. A. E. Carlson and Clifford Struyk. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 287-288.

Bath composition and formulation, operating conditions, maintenance, control. (L17, Cu)

157-L. Gold Plating. Edward A. Parker. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 290 + 8 pages.

Decorative plating, antique golds, variables in gold alloy plating, throwing power of gold solutions, industrial gold plating, testing of deposits. 4 ref. (L17, Au)

158-L. Indium Plating. Daniel Gray. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 302-305.

Both formulations for sulfate, fluoborate, sulfamate, cyanide baths. 23 ref. (L17, In)

159-L. Iron Plating. Almo D. Squitero. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 305-311.

Chloride, sulfate, fluoborate baths. 3 ref. (L17, Fe)

160-L. Lead Plating. F. C. Mathers. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 311-317.

Fluosilicate, fluoborate, sulfamate, other acid baths, alkaline lead baths. 41 ref. (L17, Pb)

161-L. Lead-Tin Alloy Plating. A. E. Carlson and Clifford Struyk. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 317-320.

Lead and tin fluoborate analyses, bath composition, preparation, control. (L17, Pb, Sn)

162-L. Nickel Plating. Walter H. Prine. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 321-322, 324-330.

Plating solutions of a nonproprietary nature usually used for a specific purpose. Suggested corrections for plating difficulties. Graphs. 5 ref. (L17, Ni)

163-L. Bright Nickel Plating. E. B. Saubestre. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 330, 332-338.

Plating for decorative purposes. Organic bright nickel, nickel alloy, highly buffable nickel baths, PR plating, electro-polishing. Tables. 37 ref. (L17, L13, Ni)

164-L. Black Nickel Plating. A. T. Marinaro and Louis Packman. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 338-339.

Used primarily for appearance and color, the deposit thickness is about 0.00005 in. and is therefore not durable. Solution composition and operating conditions. (L17, Ni)

165-L. Palladium Plating. Harold Robinson. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 340-341.

Composition of sodium palladium nitrite, diammino nitrite, acid chloride baths. Greatest application is in the electronics field. (L17, Pd)

166-L. Platinum Plating. Harold Robinson. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 341-342.

"P" salt bath and chloroplatinic acid bath. (L17, Pt)

167-L. Rhodium Plating. Harold Robinson. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 342-345.

Composition of phosphate, sulfate, heavy deposit baths; barrel rhodium plating process. Graph. (L17, Rh)

168-L. Ruthenium Plating. Harold Robinson. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 346.

Deposits can be produced to 0.0015 in. thickness. Bath formula for satisfactory deposits. (L17, Ru)

169-L. Silver Plating. N. E. Promisel. *Metal Finishing Guidebook—Directory Ed.),* 1956, p. 346 + 5 pages.

Makeup and operating conditions for a strike solution and three plating solutions; effects of different factors on solution properties and

operation; high-speed plating baths; work treatment. (L17, Ag)

170-L. Tin Plating From Acid Baths. F. C. Mathers. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 353-357.

Three solutions. Pickling, anodes, addition agents, sludge control. 41 ref. (L17, Sn)

171-L. Tin Plating From the Fluoborate Bath. A. E. Carlson and Clifford Struyk. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 358-359.

Bath composition and operating conditions. (L17, Sn)

172-L. Tin Plating From Alkaline Stannate Baths. Frederick A. Lowenheim. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 359-365.

Distinguishes between sodium stannate and potassium stannate baths; solution composition for still tank and barrel plating. Control and maintenance, temperature, voltage, sludge, plating time, equipment, quality control. 1 ref. (L17, Sn)

173-L. Tin-Nickel Alloy Plating. Frederick A. Lowenheim. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 366-368.

Deposit characteristics, solution composition, equipment, operation and control, stripping. 3 ref. (L17, Sn, Zn)

174-L. Plating Tin-Zinc Alloys. Frederick A. Lowenheim. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 368-372.

Formulations for still tanks and automatics and for barrels, specifications for working conditions, anodes, current-time relationships, control and influence of variables. (L17, Sn, Zn)

175-L. Acid Zinc Plating. R. O. Hull. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 372-373.

Solution composition and maintenance, operating conditions. Acid zinc plating provides a smooth, white, rust-resistant coating. (L17, Zn)

176-L. Cyanide Zinc Plating. R. O. Hull. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 373-375.

Solution composition and maintenance. 1 ref. (L17, Zn)

177-L. Barrel Plating Fundamentals. H. J. Struckhoff. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 376, 378, 380.

Equipment, material, contacts, load, area, speeds, current. (L17)

178-L. Plating on Plastics. Harold Narcus. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 380-385.

Chemical reduction, mirror spray, and metal evaporation methods. 16 ref. (L23, L25)

179-L. Filtration of Plating Solutions. Harold W. Faint. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 387 + 4 pages.

Filter aids and trouble shooting pointers for suction lines, pumps, valves. (L17)

180-L. Rinsing Techniques. Joseph B. Kushner. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 399-404.

Calculating amount of rinse water necessary for multiple tank rinsing with and without cascade feeding. Wetting agents, size and design of rinse tanks, automatic rinse control. Diagram, graphs. 8 ref. (L17)

181-L. Immersion Plating. Nathaniel Hall. *Metal Finishing (Guidebook—Directory Ed.),* 1956. p. 410-413.

Formulas and bath temperatures for arsenic, brass, cadmium, cobalt, copper, gold, lead, nickel, silver and tin plating on various metals. 8 ref. (L16)

182-L. Electroless Nickel. Harry J. West. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 414-415.

Provides formulas for still tank and barrel operations using acid and alkaline-type solutions. (L14, Ni)

183-L. Electropolishing. Charles L. Faust. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 415-424.

Advantages, limitations, costs, general procedures, commercial methods, equipment. Diagram, tables. 8 ref. (L13)

184-L. Stripping Metallic Coatings. Nathaniel Hall, G. B. Hogaboom, Jr., and J. B. Mohler. *Metal Fininshing (Guidebook—Directory Ed.),* 1956, p. 426-428, 430-434.

Formulas for stripping brass, cadmium, copper, chromium, gold, bronze, lead, nickel, rhodium, silver, tin, tin-zinc alloy, zinc and oxide and phosphate coatings from metals. (L12)

185-L. Anodizing Aluminum. Nathaniel Hall. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 435-438.

Outlines chromic acid, sulfuric acid and hard anodizing processes, cites conditions under which each is applicable. Graph. (L19)

186-L. Coloring Anodized Aluminum. Frank P. Stiller. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 439-440, 442-443.

Equipment, rinsing, sealing, shade, dyeing conditions, surface preparation, multicolor anodizing, lightfastness of dyed coating. (L19, Al)

187-L. Surface Treatments for Magnesium. Myron B. Diggin. *Metal Fin-*

ishing (Guidebook—Directory Ed.), 1956, p. 443-463.

Cleaning, pickling, mechanical finishing, paint base, black, electrochemical and other treatments, assembly protection, organic coatings, specifications. Tables. 1 ref. (L general, Mg)

188-L. Chromate Coatings. Walter E. Pocock. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 464 + 8 pages.

Aids in selection and operation of suitable treatment for any given application. Tables. (L14)

189-L. Chemical Conversion Coatings. S. Spring. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 477-481.

Desired characteristics and functions of phosphate coatings, types and methods of application, factors influencing crystal size, sealing and operational cycles. (L14)

190-L. Control of Plating Baths With Plating Cells. R. O. Hull. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 500-503.

Testing procedure, observation and variables controllable by the Hull Cell. Diagrams, graphs. (L17)

191-L. pH Control. Everett A. Hodges. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 503-504, 506-508.

Colorimetric and electrometric methods for testing pH of plating baths. 4 ref. (L17)

192-L. Pickling Processes Reviewed. II. Choice of Plant. D. J. Fishlock. *Product Finishing,* v. 8, Dec. 1955, p. 52-68, 104.

Plant and facilities involved in processes. Diagrams, graphs, table, photographs. (To be continued.) (L12)

193-L. Electropolishing Methods for Silver and Gold. J. M. Leslie. *Product Finishing,* v. 8, Dec. 1955, p. 69-75.

Chief processes. Graphs, table. 16 ref. (L13, Au, Ag)

194-L. Hard Chromium Plating of Tool Steels. A. W. F. Comley and T. E. Such. *Product Finishing,* v. 8, Dec. 1955, p. 76-80, 104.

Pretreatment methods and plating baths used. Graph, photograph, tables. (L17, TS, Cr)

195-L. Inert-Gas Metal-Arc Welding Clads 102-In. Propeller. C. S. Sherman. *Welding Journal,* v. 34, Dec. 1955, p. 1196-1197.

Propeller company saves time, cuts cost using inert arc welding to build up nickel-vanadium steel. Photographs. (L24, K1, AY-q)

196-L. Crack Arresting by Overlays of Notch-Tough Weld Metal. P. P. Puzak and W. S. Pellini. *Welding Journal,* v. 34, Dec. 1955, p. 577S-581S.

Test results indicate that cladding of a brittle steel by such deposits imparts a high order of resistance to the initiation and propagation of brittle fracture. Photographs, micrographs, graphs. 5 ref. (L24, Q26)

197-L. Advantages of Phosphate Coatings in Fastener Forming. John H. Geyer and Hugh Gehman. *Wire and Wire Products,* v. 30, Dec. 1955, p. 1490-1493, 1528-1532.

Coatings have helped make practical the use of true-size rod in nut forming; certain effects and benefits are realized in forming specialty bolts, screws and rivets or in other difficult operations; extensive tool life increase is indicated. Photographs, flowsheet. (L14, ST)

198-L. Electrodeposition. A. E. Davies. Paper from "Reports on the Progress of Applied Chemistry". v. XXXIX. Society of Chemical Industry, p. 117-128.

Results on 13 specific metals and on porous metals, metal powders, alloys. General theory. 160 ref. (L17)

199-L. Alloy Plating Can Give Your Products New Appeal. F. A. Lowenheim and R. T. Gore. *Iron Age,* v. 176, Dec. 22, 1955, p. 67-70.

Plating of allovs is gaining importance because it offers unique combinations of properties and improved sales appeal of products with attractive new coatings. Photographs. (L17, Cu, Ni)

200-L. Tin Alloy Coatings. S. C. Britton. *Metal Industry,* v. 87, Dec. 16, 1955, p. 510-511.

Results of investigations into possible alternatives to decorative nickel-chromium finishes. Photographs. 5 ref. (L17, Ni, Cr, Sn)

201-L. Protective Coatings for Steels Used Up to 1000° F. *Metal-Working,* v. 12, Jan. 1956, p. 14-16.

Treatment employed in selecting the protective coating for a low-alloy steel part; applications and limitations of various coatings. Table, photographs. (L16, L17, L26, ST)

202-L. Science for the Coatings Technologist. II. Pigments: General Considerations; White Pigments. E. S. Beck. *Organic Finishing,* v. 16, Dec. 1955, p. 6, 8-14.

Scientific principles, explained in a simple manner, that are encountered in organic finishing practices. Photograph, table, micrographs, graphs. (To be continued.) (L26)

203-L. A Survey of Novelty Finishes. II. Harry Burrell. *Organic Finishing,* v. 16, Dec. 1955, p. 15-20.

Pebble, hammer and metallic finishes, veiling lacquers, spatters. Materials, preparation, application methods. Photographs, micrographs. (To be continued.) (L general)

204-L. An Evaluation of Organic Coatings for Use in Cathodically Protected Domestic Hot-Water Tanks. B. G. Brand, F. W. Fink, G. A. Hudson and E. R. Mueller. *Paint and Varnish Production,* v. 46, Jan. 1956, p. 25-32.

Organic coatings used on domestic hot-water tanks, protected with magnesium anodes, must have alkali resistance and water impermeability. Epoxy-phenolic resins appear to be the solution. Graphs, diagram, photograph, tables. 4 ref. (L26, R10)

205-L. Developments in Steel Containers Solve Shipping Problems. *Paint and Varnish Production,* v. 46, Jan. 1956, p. 33-35.

Construction, specifications, decorations and internal coatings on steel containers. Diagrams, photographs. (L26, ST)

206-L. Consistent Barrel Finishing Assured By File System. *Precision Metal Molding,* v. 14, Jan. 1956, p. 59-61.

A file system which greatly simplifies processing of many different parts in the manufacture of business machines and the versatility required to meet important conditions. Photographs. (L10)

207-L. Chromium Plating Rocket Motors. *Steel,* v. 138, Jan. 16, 1956, p. 74.

A method for plating chromium uniformly on the serrated interiors of hourglass-shaped rocket engines. Photograph. (L17, Cr)

208-L. Electrotinning Tightens Wire Coating Control. *Steel,* v. 138, Jan. 16, 1956, p. 90-91.

Advantages of electrotinning of copper wire and the method used to set up a wire electrotinning line. Micrograph, photograph, table. (L17, Sn, Cu)

209-L. (Czech.) Determination of the Effect of Inhibitors in Pickling Baths. J. Kolofik. *Hutnik,* v. 5, no. 10, Oct. 1955, p. 315-316.

Evolution of hydrogen during pickling, temperature of bath, amount of inhibitor. Table, graph, diagrams. (L12, ST)

210-L. (Czech.) Chemical Polishing of Metals. V. Dlouhy, *Strojirenstvi,* v. 5, no. 11, Nov. 1955, p. 837-841.

Advantages in polishing of copper, aluminum and their alloys. Precleaning procedures, regeneration of solutions, determination of degree of polish. Photographs, diagrams. 5 ref. (L12, Al, Cu)

211-L. (French.) Surface Treatment of Aluminum and Its Alloys. I. Mechanical Treatment. Mechanical Polishing. Charles Etienne and Francois Flusin. *Revue de l'aluminium,* v. 32, no. 225, Oct. 1955, p. 921-931.

Reviews buffing and polishing machines, types of polishing, polishing defects. Table, photographs, diagrams. (L10, Al)

212-L. (German.) Flame-Sprayed Light Metal Bearings. G. Vogelpohl, A. Matting and K. F. Hahn. *Aluminium,* v. 31, no. 11, Nov. 1955, p. 544-553.

Practical application of fused light metal spraying for plain bearing production. Photographs, graphs, tables, diagrams, micrographs. 21 ref. (L23, Al)

213-L. (German.) Cleaning of Metallic Surfaces by Shot Blasting. Otto Peltzer. *Stahl und Eisen,* v. 75, no. 25, Dec. 1955, p. 1681-1691.

History, theory of process, secondary effects, machines used, cleaning mediums, method of working. Diagrams, graph. 5 ref. (L10)

214-L. (German.) Cold Zinc—A New Remarkable Surface Protector. I. C. Fritz. *Werkstoffe und Korrosion,* v. 6, no. 11, Nov. 1955, p. 521-523.

Process and advantages of coating metals with zinc paste as a substitute for galvanic method. 12 ref. (L15, Zn)

215-L. (German.) Effect of Light on the Solubility of Copper in Electrolytes. T. Markovic and O. Jaric. *Werkstoffe und Korrosion,* v. 6, no. 11, Nov. 1955, p. 535-538.

Photo and electrochemical treatments of the problem. Graphs. 12 ref. (L17, Cu)

216-L. (Polish.) Determination of the Amount of Free Acid in Bath for Pickling Steel. Kazimierz Janas. *Wiadomosci hutnicze,* v. 11, no. 11, Nov. 1955, p. 347-349.

Study of chemical removal of oxides and scale provides data for nomogram to determine amounts of free H_2SO_4 and free HCl in pickling bath. Graph, nomograms. (L12, ST)

217-L. (Russian.) Destruction of Metal Surface in Relation to the Angle of Impact of Abrasive Particles. V. N. Kashcheev. *Zhurnal tekhnicheskoi fiziki,* v. 25, no. 13, Nov. 1955, p. 2365-2368.

Copper and aluminum bronzes were subjected to the abrasive action of corundum grains at different speeds and angles to determine

conditions of maximum wear. Graphs, diagram. 6 ref. (L10, Q9, Cu)

218-L. Automatic Electrostatic Spraying. Gives Better Uniformity of Ground Coat. *Automotive Industries,* v. 114, Jan. 15, 1956, p. 65.

New automobile paint spraying process capable of applying two coats of uniform ground coating to 125 cars per hr. Photograph. (L26)

219-L. The Production of Glass-Lined Water Heaters. *Finish,* v. 13, Jan. 1956, p. 17R-20R.

Production methods and special equipment used. Photographs. (L27, ST)

220-L. Cleaning Stainless Steel—Easiest Method Is Best Method. Walter Kaiser and Richard E. Paret. *Food Processing,* v. 17, Jan. 1956, p. 24-25.

Tables of recommended cleansers and detergents, treatment of hard-to-clean deposits, corrosion inhibitors. Photographs, tables. (L10, L12, R10, SS)

221-L. Preparation and Properties of Polyurethane Coatings. Charles B. Reilly and Milton Orchin. *Industrial and Engineering Chemistry,* v. 48, Jan. 1956, p. 59-63.

Preliminary development and properties of a successful coating for high-speed aircraft in which the aluminum was protected against rain-erosion. Photograph, tables, graph. 6 ref. (L26, R4, Al)

222-L. Accelerated Tests for Mildew Resistance of Oil Paints. Robert M. Evans and Edward G. Bobalek. *Industrial and Engineering Chemistry,* v. 48, Jan. 1956, p. 122-125.

Accelerated tests compared with long-term service tests. Weathering is important before resistance measurement. Tables. 22 ref. (L26)

223-L. Metallizing Saves a Stainless Steel Shaft. *Industry & Welding,* v. 29, Jan. 1956, p. 74-76.

Process for metallizing a damaged shaft so that hardness and other properties of the repaired area are much beter than in the original material. Photographs. (L23, SS)

224-L. Aluminizing Curbs High Temperature Erosion. W. G. Patton. *Iron Age,* v. 177, Jan. 12, 1956, p. 74-77.

One of the first high-speed installations flame spraying corrosion-resistant aluminum on alloy steel engine valves. Photographs. (L23, Al)

225-L. Spray-Welded Alloy Overlay Triples Part Life. *Iron Age,* v. 177, Jan. 12, 1956, p. 83.

Coating that portion of a rod where critical abrasive conditions are encountered has given tripled service life to the rod. Photograph. (L23)

226-L. New Building Trends Expand Anodizers' Market. *Iron Age,* v. 177, Jan. 19, 1956, p. 74-77.

Aluminum curtain wall construction is rapidly expanding field for use of anodized sheet. Problems faced by anodizers, new equipment and methods, instrumentation for quality control of coating thickness. Photographs. (L19, T26, S14, Al)

227-L. Dual Spray Approach Can Tailor Your Coating Line. Martin Abel. *Iron Age,* v. 177, Jan. 19, 1956, p. 80-82.

Advantages of combining electrostatic and manual paint spraying. Procedures and equipment for coating of instrument panel housings. Photographs. (L26)

228-L. Technical Developments of 1955. Nathaniel Hall. *Metal Finishing,* v. 54, Jan. 1956, p. 43-52.

Review of literature and patents dealing with cleaning, pickling, polishing, aluminum plating and anodizing, metallic coatings, metallizing, conversion films, corrosion prevention, testing and control and waste treatment. 366 ref. (L general)

229-L. Practical Throwing Power. J. B. Mohler. *Metal Finishing,* v. 54, Jan. 1956, p. 53-55.

Plating bath formula, covering power, formulas for throwing power, solving metal distribution problems. Concludes that the experimental approach offers best possibilities for solution of throwing power problems at the present time. Diagrams, graphs. 7 ref. (L17)

230-L. Painting of Structural Steelwork. *Paint Technology,* v. 19, Dec. 1955, p. 417-420.

Effect of paint composition on its protective properties. Priming paints with linseed oil base are superior, probably due to greater film thickness. Photographs, tables. (To be continued.) (L26, ST)

231-L. Exchanger Preventive Maintenance Pays. R. Everett Butler and Russell P. Coleman. *Petroleum Refiner,* v. 35, Jan. 1956, p. 111-114.

Coordination among operating, inspection and maintenance departments, and good methods pay off in better performance and reduced downtime. Photographs. (L10, A5)

232-L. Finishing Office Equipment. Ezra A. Blount. *Products Finishing,* v. 20, Jan. 1956, p. 16-26.

Three compact, conveyorized painting and baking systems em-

ployed to apply one-coat baked wrinkle finish to metal office equipment. Photographs. (L28)

233-L. **Notes on the Use of Water for Cleaning and Electroplating.** Edward Eagle. *Products Finishing*, v. 20, Jan. 1956, p. 38 – 5 pages.

Natural waters, metallic impurities, methods for softening water, discharge of waste liquids, costs of water. Photographs. (L12, L17)

234-L. **Electroplating on Magnesium.** Seymour Sanderoff. *Products Finishing*, v. 20, Jan. 1956, p. 52 + 7 pages.

Steps involved for plating of magnesium and properties of the coatings. Graphs, photographs. (L17, Mg)

235-L. **Top Quality Metal Processes Protect Today's Skyscrapers.** *Products Finishing*, v. 20, Jan. 1956, p. 70-74, 76.

Finishing processes which protect building surfaces against corrosion and other weather conditions and maintain their attractive appearance. Photographs. (L general, T28, Al)

236-L. **Plating With Carbide.** Ralph H. Eshelman. *Tool Engineer*, v. 36, Jan. 1956, p. 117-122.

In the flame-plating process, a coating is deposited by blast tungsten carbide particles, in an explosive-gas carrier, through a gun. Properties of the base material and the coating are retained. Photographs, micrographs, diagrams, tables. (L24)

237-L. **Improvement of Wear Resistance of Cold-Header Dies by Gas Chromizing.** G. N. Dubinin and B. V. Gal'chenko. *Henry Brutcher Translation No. 3523*, 3 p. (From *Stanki i instrument*, v. 26, no. 8, 1955, p. 17.) Henry Brutcher, Altadena, Calif.

Chromized layers from 0.02 to 0.04 mm. thick produce dies with five to six times more service when correctly heat treated. Graph. (L15, Q9, T5, Cr)

238-L. (Dutch.) **Hard Facing by Means of the Unionmelt Welding Method.** P. G. Weeber. *Smit mededelingen*, v. 10, no. 3a, Dec. 1955, p. 125-132.

Advantages, welding instructions, detailed examples of process. Tables, graphs, diagrams, photographs. (L24)

239-L. (French.) **Hot Galvanizing of Bolts and Small Pieces.** A. Gordet. *Métallurgie et la construction mécanique*, v. 87, no. 12, Dec. 1955, p. 979, 981, 983.

Need of centrifuging to obtain high-quality pieces. Photographs, diagrams. (L16, Zn)

240-L. (German.) **Behavior of Aluminum in Buffer Solution. A. R.** Tourky, W. Masoud and K. Hussein. *Aluminium*, v. 31, no. 12, Dec. 1955, p. 599-604.

Effect of hydrogen ions on the aluminum oxide film, using buffer solutions and super-purity aluminum. Short-time exposures to solutions (pH4-8) reduced film porosity to a very low level. In alkaline buffers, a protective film forms which is promoted by phosphate ions and inhibited by chloride ions. Cathodic pretreatment causes a slight loosening of the natural oxide film, more intense in acid solution. Graphs, table. 14 ref. (L14, L25)

241-L. (German.) **Surface Condition of Aluminum Semiproducts Before Anodic Oxidation.** *VDI Zeitschrift*, v. 97, no. 36, Dec. 21, 1955, p. 1320.

Elimination of surface defects by means of pickling before cold rolling or adding grain refining materials. (L12, L19, Al)

242-L. (Russian.) **Effect of Temperature on the Rate of Electrodeposition of Copper From Sulfate Solutions.** G. A. Emel'ianenko. *Doklady akademii nauk SSSR*, v. 105, no. 5, Dec. 11, 1955, p. 1003-1006.

Relationships between temperature, current density and polarization. Graphs. 9 ref. (L17, Cu)

243-L. (Russian.) **Investigation of Processes Occurring During Hot Tinplating of Sheet Iron.** I. A. Kakovskii and N. S. Smirnov. *Izvestiia akademii nauk SSSR, otdelenie tekhnicheskikh nauk*, 1955, no. 12, Dec., p. 48-57.

Physical-chemical laws of the process. Reactive diffusion of molten tin into iron. Mechanism of action of the flux and its ability to dissolve oxide films on surface of sheet metal. Diagrams, tables. 16 ref. (L16, Fe, Sn)

244-L. **Investigation of Barrel Finishing as a Means of Efficient Burr Removal.** Charles E. Kincaid. *General Motors Engineering Journal*, v. 3, Jan.-Feb. 1956, p. 34-39.

Laboratory study leads to recommended procedures for successful work. Process saves in time and money, and produces uniform results. Photographs, diagrams. (L10, ST)

245-L. **Assemble First For Lower Painting Costs.** Herbert Chase. *Iron Age*, v. 177, Jan. 26, 1956, p. 73-75.

New setup is practically automatic, permits better color matching, avoids marring of finishes. Photographs. (L26)

246-L. **Coating Tin Plate at Faster Speeds.** E. C. Haskell. *National*

Lithographer, v. 63, Jan. 1956, p. 71-72, 74.

Faster manufacturing speeds in container and closure industry has necessitated more speed in decorating and lithographing industry. Methods and problems involved. Photographs. (L26, Sn)

247-L. The Development of Coated Abrasives. R. W. Redmond. *Plating,* v. 43, Jan. 1956, p. 55-59.

Historical review. General description of various abrasives, backings, bonding materials. (L10, G18)

248-L. Barrel Finishing—A Precision Tool. William P. Nunn. *Plating,* v. 43, Jan. 1956, p. 60-63.

Selection of tumbling media and compounds, setting up test runs, suitable shapes and sizes of parts to be finished. Photographs. (L10)

249-L. Polishing Grinding Wheels. R. W. Reed. *Plating,* v. 43, Jan. 1956, p. 64-66.

Hundreds of pieces of cloth-backed coated abrasive, mounted so as to form a wheel, have improved grinding wheel performance. Photographs. (L10, G18)

250-L. Scratching the Surface. Arthur von der Linden and Steve Yacus. *Plating,* v. 43, Jan. 1956, p. 67-69.

Operational problems and developments in barrel finishing, including use of racking installations and high-velocity finishing. Photographs. (L10)

251-L. Pointers on Polishing. L. H. Vorce. *Plating,* v. 43, Jan. 1956, p. 70-71.

Tips on handling of parts, selection of abrasives, use of backstand equipment with narrow and soft contact wheels. (L10)

252-L. Pre Finish or Flat Polishing. R. W. Redmond. *Plating,* v. 43, Jan. 1956, p. 72-81.

Equipment and methods for abrasive belt polishing of flat sheet or strip steel. Diagrams, photographs, graphs, micrographs. (L10, ST)

253-L. Using Blast Cleaning Techniques for Cleaning and Finishing. Eugene F. Anderson. *Plating,* v. 43, Jan. 1956, p. 82-86.

Merits of wet blasting and dry blasting. Photographs. (L10)

254-L. Black Finish With a Bright Future. Thomas E. Murray. *Steel,* v. 138, Jan. 23, 1956, p. 72-73.

Black oxide coating is simple and economical, providing durable, attractive finish for steel products. Photographs. (L14, ST)

255-L. Plating Pit-Free, Heavy Nickel. Paul H. Margulies. *Steel,* v. 138, Jan. 30, 1956, p. 98, 101.

Nickel plating method using hydrogen peroxide to prevent pitting. Photographs. (L17, Ni)

256-L. Hardfacing Applications in the Iron and Steel Industry. M. Birkhead. *Welding and Metal Fabrication,* v. 24, Jan. 1956, p. 25-32.

Hardfacing techniques, choice of electrodes, service and other tests on ingot dog bits, hot shear blades, pneumatic punches. Micrographs, graphs, tables, photographs. 3 ref. (L24, Fe, ST)

257-L. Aircomatic Used to Repair Cast Nickel-Vanadium Steel. C. S. Sherman. *Western Machinery and Steel World,* v. 47, Jan. 1956, p. 90-91.

Use of stainless steel wire on nickel-vanadium steel ferry propellers gives entire blade areas sure protection against service erosion, while holding cost of repairs to bare minimum. Photographs, table. (L24, T22, SS, AY)

258-L. (German.) Rust Pretreatment by Phosphoric Acid. Gerhart Schultz. *Metalloberfläche,* Ausgabe B, v. 9, no. 12, Dec. 1955, p. 177-179.

Acid serves as a surface conditioner of steel prior to painting or application of other coatings. Photographs. 4 ref. (L12, L26)

259-L. (German.) Studies of Residue on Metal Surfaces After Pickling. Armin Petzold. *Metalloberfläche,* Ausgabe A, v. 9, no. 12, Dec. 1955, p. 205-207.

Pickling process in sulfuric and nitric acids. Analysis of pickling residue on metal. Tables. 5 ref. (L12, ST)

260-L. (German.) Zinc Dust Compounds. J. F. H. van Eijnsbergen. *Werkstoffe und Korrosion,* v. 6, no. 12, Dec. 1955, p. 571-575.

Zinc paint should contain enough zinc powder so the dry film will consist of 94% zinc. Protective action of the paint is due to cathodic protection as well as sealing off the atmosphere. Photographs. 27 ref. (L26, Zn)

261-L. (German.) Progress in Electroplating. Artur Kutzelnigg. *Werkstoffe und Korrosion,* v. 6, no. 12, Dec. 1955, p. 577-580.

Survey of German postwar progress in electroplating, including bright and leveling deposits, automatic plants, degreasing, nickel substitutes, anodic brightening and standardization. Photographs. (L17)

262-L. Maintenance Painting Procedures. A. L. Kimmel. *American Water Works Association, Journal,* v. 48, Jan. 1956, p. 91-94.

Experience, proper surface preparation and correct methods of application and selection of paint are

important factors to be considered in maintenance painting. 6 ref. (L26)

263-L. Coppertone Sinks—How They Are Made at AVCO. *Ceramic Industry,* v. 66, Feb. 1956, p. 48-49.

Plant produces 3400 to 3600 sinks daily, fabrication being done in company's own press shop. Describes pressing operation, enamel preparation, ground coat spraying and firing, cover coat spraying, highlighting techniques, firing. Photographs. (L27, ST)

264-L. How Halrick Enamels Aluminum. *Ceramic Industry,* v. 66, Feb. 1956, p. 55-56.

Notable features are three different cleaning methods used for various types of alloys instead of one set process, with emphasis placed on adequate rinsing. Parts are sprayed with conventional enamel spray gun, then dried by chromolox infrared units before firing in box-type furnace. (L27, Al)

265-L. Proper Design for Painting. H. G. Kirtley and W. G. Colter. *Chemical Engineering,* v. 63, Feb. 1956, p. 187-192.

Design factors which affect service life of protective paints in plant equipment and structures; examples of design problems in plants and possible solutions. Photographs, diagram. (L26)

266-L. A New Method for Assessing the Resistance of Paint Films to Fungal Growth. W. R. Hindson and J. R. Rischbieth. *Commonwealth of Australia, Dept. of Supply, Defense Standards Laboratories Report* 219, Sept. 1955, 7 p. + 2 plates.

A more severe method of testing the fungal resistance of paints is described. It is recommended that this method replace the one described in the Draft Commonwealth Specification. Table, photographs. 8 ref. (L26, R11)

267-L. Anti-Corrosive Applications of "Epikote" Resins. David H. Nicholson. *Corrosion Technology,* v. 3, Jan. 1956, p. 4-7, 18.

Epikote resins are based on two chemicals; epichlorhydrin and diphenylolpropane, derived from petroleum. They have exceptional resistance to chemical action and their superior properties of adhesion, toughness and flexibility make them suitable for a wide range of special and general applications. Photographs, tables. (L26)

268-L. Boiler Scale Control. Vernon H. Farthing. *Fuel Efficiency,* v. 4, Dec. 1955, p. 194-195.

"Crustex" descaler dislodges by means of pulses of ultrasonic energy. Its use decreases risk of caustic cracking. Photographs. (L10)

269-L. Canada's Decorative Finishers for the Toy Trade Use Electro-Formed Masks. F. D. Johnson. *Industrial Finishing (London),* v. 9, Dec. 1955, p. 259-262.

Electro-formed masks enable toy industry to speed up production by spray painting. Manufacture and use of masks described. Photographs. (L18, L26, Cu, Ag)

270-L. Metallic Coatings on Non-Metallic Materials. VI. Gold Films. *Industrial Finishing (London),* v. 9, Dec. 1955, p. 269-270, 272.

Methods for forming gold films on mirrors. (L16, Au)

271-L. German Finishers Consider the Problems of Copper Anodes for Faultless Electroplating. H. Bovet. *Industrial Finishing (London),* v. 9, Dec. 1955, p. 278, 280. (From *Pro-Metal,* 1955, no. 43, p. 452-456.)

Previously abstracted from original. See item 280-L, 1955. (L17, Cu)

272-L. Brass Plating From Cyanide-Free Alkaline Solutions. S. K. Ray, H. V. K. Udupa and B. B. Dey. *Journal of Scientific & Industrial Research,* v. 14, sec. B, Dec. 1955, p. 652-655.

Cyanide was replaced by alkaline solution of copper sulfate in glycerine and sodium zincate solution. From current density studies, a method was worked out to deposit brass consisting of 70% copper and 30% zinc. Tables, graphs. 13 ref. (L17, Cu)

273-L. Success in Color Anodizing. Kim Darby. *Modern Metals,* v. 11, Jan. 1956, p. 74 + 4 pages.

Rapid expansion in this field, new applications in automobile and refrigeration industry and other decorative uses, corrosion resistance properties compared with chromium plating. Describes automatic anodizing system, processes and quality control methods used. Photographs, diagram. (L19, Al)

274-L. Experiments on Paint Adhesion Under Moist Conditions. D. M. James. *Oil & Colour Chemists' Association, Journal,* v. 39, Jan. 1956, p. 39-62, Disc. 62-66.

Various systems of primers and finishing were investigated in fresh and salt water. Adhesion is much less affected by salt water. Nature of the primer coat is major factor determining adhesion. Tables, diagrams, photograph, graphs. 7 ref. (L26, R4)

275-L. Automatic Aluminizing of Valves at Pontiac. Ralph H. Eshelman. *Tool Engineer,* v. 36, Feb. 1956, p. 79-84.

Development of successful process for aluminizing intake and exhaust valves to increase resistance to heat oxidation and atmospheric corrosion. Photographs, diagrams, tables. (L16, Al)

276-L. Making Spray Painting Operations Automatic. Eric H. Cocks. *Tool Engineer,* v. 36, Feb. 1956, p. 99-105.

Methods, applications, advantages and equipment necessary for automatic spray painting. Photographs, diagrams. (L26)

277-L. (Czech.) **Pickling of Alloy Steels.** Josef Rones. *Hutnik,* v. 5, no. 8, Aug. 1955, p. 234-237.

Difficulties involved and uneconomical methods that result in loss of steel and pickling solutions. Recommended pickling baths and new patents for pickling alloy steels. Graphs, diagram. 8 ref. (L12, AY)

278-L. (Russian.) **Volume-Weight Method of Determining Thickness of Oxide Film on Electropolished Aluminum.** P. V. Shchigolev. *Zavodskaia laboratoriia,* v. 21, no. 12, 1955, p. 1474-1476.

Determination of weight and thickness of film in relation to length of polishing time. Table. 5 ref. (L13, S14, Al)

279-L. (Russian.) **Problem of Multilayer Chromium Plating.** A. N. Sysoev and N. T. Drobantseva. *Zhurnal prikladnoi khimii,* v. 28, no. 12, Dec. 1955, p. 1308-1313.

Comparion of cohesive strength of deposits when intermediate anodic etching and cathodic polarization are employed. Conditions for obtaining consistent homogeneous cathodic film obtained in pure chromic acid (without SO_4—ions). Colors of films. Film can be used as anticorrosive and decorative coating for copper and steel. Micrographs, tables. 3 ref. (L17, Cr)

280-L. The Development of an Insulating Enamel. Myron J. Conway, Jr. *American Ceramic Society Bulletin,* v. 35, Jan. 1956, p. 6-10.

Experiments carried out in developing glass-bonded vermiculite enamel which gives insulating and sound absorbing properties to metals. From study of various ways of applying enamel, it was concluded that best results were obtained when large vermiculite particles were concentrated at the top and glass concentrated at the bottom. Photographs, graph, tables. (L27)

281-L. A Radioisotope Study of the Nickel Dip. Joseph C. Richmond, Harry B. Kirkpatrick and William N. Harrison. *American Ceramic Society, Journal,* v. 39, Feb. 1956, p. 39-46.

Radio-isotope tracer studies of the deposition of nickel during nickel dipping of steel and of the effect of this nickel deposit on the reduction of cobalt ions to metallic cobalt during enamel firing. Graphs, photographs, tables. 7 ref. (L16, L27, Co, Ni, ST)

282-L. Automatic Plating of Bumpers. *Automation,* v. 3, Feb. 1956, p. 34-37.

System for precleaning, plating, reclaim and rinsing in automobile bumper plant. Photographs. (L17)

283-L. Plastic Coatings—for Corrosion Prevention. G. A. Curson. *Corrosion Prevention and Control,* v. 3, Jan. 1956, p. 30-34.

A tabular guide to types of plastic coatings applicable to the protection against several corrosive agents. Table, photographs. (L26)

284-L. Acid and Alkali Resistant Protective Paints. II. Coatings Based on Epoxide and Other Resins. W. L. Yeo. *Corrosion Prevention and Control,* v. 3, Jan. 1956, p. 35-36.

Types and qualities of paint useful in corrosion protection. (L26)

285-L. Anodization of Lead in Sulfuric Acid. Jeanne Burbank. *Electrochemical Society, Journal,* v. 103, Feb. 1956, p. 87-91.

Diffraction study of anodic corrosion products. Co-ordinated potential-time curves show arrests corresponding to appearance of these compounds. Tables, graphs, diagrams. 14 ref. (L19, Pb)

286-L. Clay-Free Porcelain Enamels. A. L. Friedberg. *Finish,* v. 13, Feb. 1956, p. 44-45, 86.

Tests using colloidal silica powder as suspension agent for several different titania enamels. Table, graph. (L27)

287-L. Lithographing Metal Sheets for Cans. Frank Campbell. *Industrial Finishing,* v. 32, Feb. 1956, p. 32 + 5 pages.

Equipment, materials and methods for mass-production operation. Photographs. (L26)

288-L. Painting Setup at New Electric Products Plants. Walter Rudolph. *Industrial Finishing,* v. 32, Feb. 1956, p. 42-44, 46.

Description of spray booths, degreasing equipment, ovens and other facilities to process diversified line of products. Photographs. (L26)

289-L. Coatings for Vacuum Metallized Plastics. C. C. Barbera. *Indus-*

trial Finishing, v. 32, Feb. 1956, p. 52, 54.

Problems in formulating base coats, selection of solvents, desirable properties of top coats. (L25)

290-L. Painting Pails and Covers Automatically. George E. McMahon. *Industrial Finishing,* v. 32, Feb. 1956, p. 78-80, 82.

Outside of pails are sprayed electrostatically, inside surfaces are sprayed by two extension spray guns operating on the withdrawal stroke only. Photographs. (L26, ST)

291-L. Techniques in Polishing Die-Castings. T. P. Barbicane. *Machinery,* v. 62, Feb. 1956, p. 167-173.

Methods and devices for polishing die cast parts. Diagrams. (L10)

292-L. The Electrodeposition of Tungsten. G. L. Davis and C. H. R. Gentry. *Metallurgia,* v. 53, no. 315, Jan. 1956, p. 3-16.

Experimental data and theoretical aspects of deposition from aqueous solutions and organic solvents, with special attention to deposition from fused salt baths containing borates and tungstic oxide. Micrographs, tables, graphs, diagram. 49 ref. (L17, W)

293-L. Epoxy Coating Safeguards Laboratory Furniture. William A. Poe. *Metal Progress,* v. 69, Feb. 1956, p. 62-65.

Step-by-step coating operations for furniture subjected to hard service conditions. Photographs, table. (L26)

294-L. Conversion Coatings for Cadmium and Zinc. Edward F. Foley, Jr. *Metal Progress,* v. 69, Feb. 1956, p. 86-90.

Economical and versatile finishes for cadmium and zinc-plated parts and zinc-base die castings. With minor modifications in processing conditions, a wide range of surface finishes can be obtained. No expensive equipment is required. Table, photograph. (L14, Cd, Zn)

295-L. Hydrogen Contamination of Titanium Minimized by Modified Descaling Bath. H. L. Alexander, H. H. Farrell and Q. D. Wheatley. *Metal Progress,* v. 69, Feb. 1956, p. 78-80.

Saturation of sodium hydride baths with titanium dioxide minimized hydrogen pick-up. The coarser grades of titanium dioxide should be used and must be added slowly to avoid excessive foaming and gas evolution. Tables, graphs. (L12, Ti)

296-L. The Painting of Structural Steelwork. Third Interim Report. *Paint Technology,* v. 20, Jan. 1956, p. 15-17.

Litharge and lead linoleate have little effect on the life of red oxide-linseed oil primers. Photographs, table. (L26, ST)

297-L. Proposed Substitutes for Nickel Plating. A. Kenneth Graham. *Plating,* v. 43, Feb. 1956, p. 218-220.

Summary of data from 13 companies regarding coatings on ferrous-base metals. Indoor and outdoor applications, durability, properties, rating relative to nickel plating are considered. Tables. (L17, Ni)

298-L. Commercial Anodic Surface Treatments for Aluminum and Its Alloys. Russell V. Vanden Berg. *Plating,* v. 43, Feb. 1956, p. 221-232.

Anodic coatings discussed in regard to historical background, formation of oxide coating, electrolytes, effect of alloy composition, electrobrightening, commercial applications, method of application, testing methods and specifications. Micrographs, tables, graph, photographs, diagram. 40 ref. (L19, Al)

299-L. Plating—Art or Science? A. H. Du Rose. *Plating,* v. 43, Feb. 1956, p. 239-243.

Incomplete knowledge of fundamentals and frequent lack of consistency and reproducibility in the results are major problems in the plating industry. Graphs, tables. (L17)

300-L. Removal of Fire Marks From Sterling Silver. F. A. Mohrnheim. *Plating,* v. 43, Feb. 1956, p. 244-247.

Characteristics and properties of "fire" in sterling silver, methods for the removal of fire marks are compiled and formulated. Micrographs. 7 ref. (L10, L12, L13, Ag)

301-L. The Measurement of Color and Gloss. Richard S. Hunter. *Product Engineering,* v. 27, Feb. 1956, p. 176-182.

Definitions and derivation of gloss and color scales. Performance and limitations of color and gloss instrumentation. Diagrams, graphs, tables. (L general, S15)

302-L. Cathodic Sputtering—an Analysis of the Physical Processes. A. Guentherschulze. *Vacuum,* v. 3, Oct. 1953 (Published Dec. 1955), p. 360-374.

Investigation of mechanism of primary and secondary sputtering with additional consideration of chemical sputtering, engineering problems, gas absorption. Graphs, diagrams, tables. 20 ref. (L25)

303-L. The Effect of the Substrate Temperature on the Condensation Coefficient of Evaporated Antimony, Gold and Silver. F. M. Devienne. *Vacuum,* v. 3, Oct. 1953 (Published Dec. 1955), p. 392-397.

Condensation coefficient was found

to decrease with increase in temperature of substrate, especially in antimony. Experimental procedures and additional factors influencing coefficient discussed. Photographs, diagram, tables. 10 ref. (L25, Ag, Au, Sb)

304-L. (Czech.) **Formation of Protective Coatings in Phosphate Bath. L.** Zemene. *Strojirenstvi,* v. 6, no. 12, Dec. 1955, p. 922-926.

Relation of deposition of coating to temperature, solution concentration and phosphatization time. Phosphatization reactions and weight losses of parts being phosphatized. Graphs, tables. 5 ref. (L14)

305-L. (Czech.) **A New Hard-Facing Material, Poldi "Carbodur 1".** Josef Nemec. *Zvaranie,* v. 4, no. 8, Aug. 1955, p. 239-241.

Preparation and properties of high-alloy material for application by flame or arc methods. Micrograph, diagrams. (L24, Fe, Cr, Mn)

306-L. (Hungarian.) **Prevention of Rusting During Transport and Storage.** *Magyar kémikusok lapja,* v. 10, no. 12, Dec. 1955, p. 388-392.

Application and thickness of coating materials, additions and their effects. Laboratory and industrial tests with a new composition "Korrozital K". Tables, graph, photograph. (L26, R10, ST)

307-L. (Russian.) **Kinetics of Formation of Boronized Layer on Iron Alloys.** M. E. Blanter and N. P. Besedin. *Metallovedenie i obrabotka metallov,* no. 6 Dec. 1955, p. 3-9.

Use of powdered amorphous boron, ferroboron, boron carbide and borax to form boron diffusion coatings. Effect of bath composition, temperature, time and alloying elements. Graphs, tables. 6 ref. (L15, B, ST)

308-L. Unipositive Beryllium as a Product of Anodic Oxidation. Barbara D. Laughlin, Jacob Kleinberg and Arthur W. Davidson. *American Chemical Society, Journal,* v. 78, Feb. 5, 1956, p. 559-561.

The electrolysis of an aqueous sodium chloride solution between beryllium electrodes in a divided cell results in the anodic conversion of the metal to both the uni and dipositive oxidation states. The dissolution process is accompanied by anodic evolution of hydrogen. Tables. 4 ref. (L19, Be)

309-L. Latex-Cement Compositions in Corrosion-Resistant Construction. I. P. B. Cormac. *Corrosion Technology,* v. 3, Feb. 1956, p. 43-46.

Development of combinations of hydraulic cement with aqueous dispersions of various elastomers. Use as coating materials. Photographs. (To be continued.) (L26, ST)

310-L. The Sodium Hydride Process for Descaling Metals. N. L. Evans. *Corrosion Technology,* v. 3, Feb. 1956, p. 47-51.

Plant equipment and operation, advantages and applications of the nonelectrolytic sodium hydride process. Photographs, diagram. 1 ref. (L12)

311-L. Protective Oil Coatings. K. F. Schiermeier and R. W. Lewis. *Lubrication Engineering,* v. 12, Jan.-Feb. 1956, p. 19-23.

Types of protective films, factors influencing selection of proper type. Basic considerations in the formulation of rust preventives. Table, graph. 1 ref. (L26)

312-L. Magnesium + Vinyl. W. deCamp Crater. *Modern Metals,* v. 12, Feb. 1956, p. 50, 52.

Marvibond process gives metal sheet a tough, tight coating of colored or textured plastic. Advantages and applications. Photographs. (L26, Mg, Al, ST)

313-L. Influence of Pre-Treatment Prior to Phosphating of Steel. S. Spring and J. C. Lum. *Organic Finishing,* v. 17, Feb. 1956, p. 5-9.

Three characteristics of zinc phosphate coatings were evaluated to determine effectiveness of the various recommended pretreatment: crystal size, coating weight, porosity. Photographs, table, graph. 4 ref. (L14, Zn, Ti, ST)

314-L. A Survey of Novelty Finishes. IV. Harry Burrell. *Organic Finishing,* v. 17, Feb. 1956, p. 19-22.

Printing process of artificial wood graining and preparation of the wood, or other materials, prior to graining. Photographs. (To be continued.) (L26)

315-L. Pickling Processes Reviewed. III. Treating Ferrous Materials. D. J. Fishlock. *Product Finishing,* v. 9, Jan. 1956, p. 72-85, 124.

Oxide layer formation, descaling mechanism, sulfuric, phosphoric, hydrochloric, oxalic and nitric acid pickling, hydrogen embrittlement, paste pickles, electropolishing, chemical polishing, control and waste disposal. Diagrams, photographs, graphs, table. (To be continued.) (L12, Fe)

316-L. Plastic Overcoats for Metal. *Steel,* v. 138, Feb. 20, 1956, p. 114.

Advantages, equipment and applications of "Whirlclad" process for plastic coating of metals. (L26)

317-L. Continuous Galvanizing Hits Its Stride. Ernest W. Horvick. *Steel,* v. 138, Feb. 6, 1956, p. 122-123.

Improved ductility of the zinc coating permits heavy forming operations without destroying corrosion-stopping qualities. Continuous process effects large savings and greater market. Photographs. (L16, Q23, Zn, ST)

318-L. Electroless Nickel Plating Offers Corrosion, Wear Resistance. *Western Metals,* v. 14, Feb. 1956, p. 64-65.

Process deposits nickel by reducing a salt to metallic nickel, using sodium hypophosphite as the reducing agent. Part is immersed in hot, buffered solution and mechanically agitated. Photographs. (L14, ST, Ni, Al, Cu, Ti)

319-L. Low Valent Aluminum as a Product of Anodic Oxidation in Aqueous Solution. Esko Raijola and Arthur W. Davidson. *American Chemical Society, Journal,* v. 78, Feb. 5, 1956, p. 556-559.

In the electrolysis, between an aluminum anode and a platinum cathode, of various aqueous solutions, aluminum dissolves anodically with an initial mean valence number significantly lower than three, and hydrogen is evolved at the anode. These facts may be interpreted in terms of primary anodic oxidation of aluminum partly to the unipositive state. Tables, graph, diagram. 15 ref. (L19, Al, Pt)

320-L. Good Polish for Aluminum. *Modern Metals,* v. 12, Feb. 1956, p. 68.

Wax-base polish effectively cleans tarnished, oxidized or weathered aluminum leaving a durable glass-like coating that is highly resistant to all types of tarnish. Photograph. (L12, Al)

321-L. The Finish That Fits. *Steel,* v. 138, Feb. 13, 1956, p. 92-94.

There is a wide variety of finishes for stainless steel. Finishing techniques and applications. Photographs, table. (L general, SS)

322-L. New Developments in Tests of Coatings and Wrappings. Graydon E. Burnett and Paul W. Lewis. *American Water Works Association, Journal,* v. 48, Feb. 1956, p. 100-120.

Laboratory and field tests of protective coatings and wrappings for steel water pipe conducted by the Bureau of Reclamation. Coatings tested were proprietary products and have been in service up to 5 years. Tables, photographs. 4 ref. (L26, ST, Zn, Pb, Al, Fe)

323-L. Design of Steel Pipe With Cement Coating and Lining. E. Shaw Cole. *American Water Works Association, Journal,* v. 48, Feb. 1956, p. 131-138.

Steel pipe with diameters of 30 in. or larger is protected by a cement coating and cement lining. Tables, photographs, graph. 8 ref. (L27, ST)

324-L. Latest Developments in Plating Automation. *Automotive Industries,* v. 114, Mar. 1, 1956, p. 40-43.

Special features of automatic equipment and controls necessary for modern operation of both large and small plating lines. Photographs. (L17)

325-L. X-Ray Analysis as a Guide to Chemical Cleaning. A. W. Coulter, C. M. Maddin and R. B. Rosene. *Combustion,* v. 27, Feb. 1956, p. 55-58.

X-ray analysis identifies not only the individual elements in the deposit but also the compounds or chemical structure of the scale. Photographs, graphs, tables. 9 ref. (L12, S11)

326-L. Paint Faults and Remedies. XVII. H. Courtney Bryson. *Corrosion Prevention and Control,* v. 3, Feb. 1956 p. 40-42.

Causes and preventive measures for precipitation, rain spotting, ropiness, sagging, other defects. Photographs. (To be continued.) (L26)

327-L. Electro-Zinc Coated Steel Sheet and Strip. D. A. Winton. *Corrosion Prevention and Control,* v. 3, Feb. 1956, p. 45-46.

Plating equipment and methods. Properties of coated sheet and strip. (L17, CN, Zn)

328-L. Anodic Film Growth on Hafnium in Nitric Acid. R. D. Misch and E. S. Fisher. *Electrochemical Society, Journal,* v. 103, Mar. 1956, p. 153-156.

In 70% nitric acid at room temperature, an anodic film developed uniformly over single hafnium crystals with a thickness dependent upon the metal crystal orientation. Micrographs, photograph, table. 6 ref. (L19, Hf)

329-L. Levelling in Bright Nickel Plating Solutions. K. E. Langford. *Electroplating and Metal Finishing,* v. 9, Feb. 1956, p. 39-43, 48.

The chemical properties of organic compounds are related to their suitability as levelling agents in bright nickel plating electrolytes. The beneficial effect of surface active agents in the solution is demonstrated. Levelling agents and methods. Diagrams, tables. (To be continued.) (L17, Ni)

330-L. Good Rinsing for Good Plating. Joseph B. Kushner. *Electroplat-*

ing and Metal Finishing, v. 9, Feb. 1956, p. 44-47.

Requirements, methods, materials and equipment. Diagrams. 8 ref. (L17)

331-L. Answers to Some Paint Application Problems. *Electroplating and Metal Finishing,* v. 9, Feb. 1956, p. 55-56.

Causes of miscellaneous paint defects such as orange peeling, rough finish, sik-screen clogging. Handling and overspray problems. Diagrams. (L26)

332-L. How to Surface Finish Stainless Steels. W. E. McFee. *Finish,* v. 13, Mar. 1956, p. 23-26.

Differences to be considered in drum sanding and polishing of stainless steel. Tables, photographs. (To be continued.) (L10, SS)

333-L. Development of Marine Paints: Recent Progress. A. D. C. Hamilton. *Industrial Finishing,* v. 9, Jan. 1956, p. 313-315.

The development of new and better types of protective paints, as applicable to requirements of various parts of ships. Photographs. (L26)

334-L. Flame Spraying Non-Metallic Protective Layers on to Metal Surfaces. Hans Reininger. *Industrial Finishing (London),* v. 9, Feb. 1956, p. 380, 382, 384. (Translated from *Metalloberfläche,* v. 9, no. 1, 1955.)

Previously abstracted from the original. See item 169-L, 1955. (L26)

335-L. Advanced Techniques for Tight Coating of Zinc. Nelson E. Cook. *Industrial Heating,* v. 23, Feb. 1956, p. 312 + 5 pages.

Cook-Norteman tight-coat galvanizing, making use of many new and unique technical procedures, simplifies and improves galvanizing through localized control for adherence. Photographs. (L16, Zn, Al, Te)

336-L. Tentative Standard Method for the Assessment of the Rust Preventing Characteristics of Hard Film and Soft Film Temporary Corrosion Preventives. *Institute of Petroleum, Journal,* v. 42, Feb. 1956, p. 50-54.

Report on method in which test panels are exposed to sulfur dioxide. Effectiveness and reproducibility studies. Tables. 3 ref. (L26, R11)

337-L. Simple Test Checks Aluminum Coating Uniformity. H. J. Wittrock. *Iron Age,* v. 177, Feb. 16, 1956, p. 102-103.

Technique involved is similar to the Preece test for galvanized steel; provides accurate gage of coating uniformity, plus an estimate of coating thickness. Micrographs, photographs. (L16, Al)

338-L. Is Bronze Plating Your Next Step? R. T. Gore and F. A. Lowenheim. *Iron Age,* v. 177, Feb. 16, 1956, p. 104-107.

The progress, advantages, processes used, future possibilities of copper-tin alloy as a metal finish. Photographs. (L17, Cu)

339-L. Canadian Tinplate. J. D. Harbron. *Iron and Steel,* v. 29, Feb. 1956, p. 49-50.

Electrolytic lines replace older hot dip methods. Photographs, graph. (L17, Sn)

340-L. Protective Coal Tar Coatings in Steel Plants. W. F. Fair, Jr., and H. J. Cibula. *Iron and Steel Engineer,* v. 33, Feb. 1956, p. 106-116; disc., p. 116-118.

Guide to preventive maintenance including design of plant, surface preparation, environment and types of coatings. Photographs, micrograph, graphs, tables. 11 ref. (L26, ST)

341-L. Plating Metal-Powder Parts. Charles C. Cohn. *Machine Design,* v. 28, Mar. 8, 1956, p. 113-114.

Survey of methods for preparation of sintered-metal parts for plating. Photograph, micrographs, table. (L17)

342-L. Try Flame-Plated Coatings Where Service is Severe. M. A. Teter. *Materials & Methods,* v. 43, Feb. 1956, p. 100-102.

Tungsten carbide flame-plated coatings increase service life and can be used on a wide variety of metals. Photographs, table, diagrams. (L24, W)

343-L. Some Tips on Electroforming. Marv Rubinstein. *Metal Finishing,* v. 54, Feb. 1956, p. 52-56.

General discussion of electroforming includes applications, advantages and disadvantages, metals and solutions, stress, selection of bath and metal, some standard practice. Photographs, table. (To be continued.) (L18)

344-L. Production Barrel Finishing. Albert Polucha. *Metal Finishing,* v. 54, Feb. 1956, p. 57-64.

Planning and layout, equipment and operating procedure, the processing of aluminum, brass, copper, plastic, steel and zinc, finishes and finishing media, fixture machines. Diagrams. (L10, Cu, Al, ST, Zn)

345-L. Proposed "Substitutes for Nickel Plating". A. Kenneth Graham. *Metal Finishing,* v. 54, Feb. 1956, p. 65-68.

Present status of nickel plating industry. Arguments against substitutes. Data on substitute coatings on ferrous basis metals. Tables. 1 ref. (L17, L14, Ni, Cr)

346-L. Metal Brightening. H. Silman. *Metal Industry,* v. 88, Feb. 10, 1956, p. 105-108, 111.

Reviews electrolytic and chemical methods for aluminum, stainless steels and other metals. Applications, advantages, limitations. Graphs, table. 8 ref. (L13, L12, Al, Fe, SS)

347-L. New Industrial Uses of Electropolishing. (Digest of "Present Status of the Electropolishing of Steel and Special Alloys in Industry", by P. Jacquet and R. Mondon; sponsored by Société Francaise de Métallurgie, June 1955.) *Metal Progress,* v. 69, Mar. 1956, p. 168, 170, 172.

Important applications in field of steels and special alloys for detection of defects, as a substitute for mechanical polishing, and for creation of a surface with improved frictional properties and wear resistance. (L13)

348-L. Metallurgy of T. R. Cell Production. Use of Diffused Copper Coatings on Mild Steel. D. S. Hills and W. L. Hirsh. *Metal Treatment and Drop Forging,* v. 23, Feb. 1956, p. 72-74.

Metallurgical problems involved in quantity production of a wave-guide device used in high-frequency radar systems. Photographs. (L15, Cu, ST)

349-L. How to Finish Stainless Steel. Richard E. Paret. *Metalworking Production,* v. 100, (Combined Issue), Feb. 10 and 17, 1956, p. 231-246.

Mill finishes and their protection, grinding, polishing and buffing, finishing small or complex parts, decorative finishes, cleaning and descaling. Photographs, tables. (L10, L17, L26, SS)

350-L. Electron Microscope Study of Paint Surfaces. Sumner B. Twiss, D. Maxwell Teague and William L. Weeks. *Official Digest, Federation of Paint and Varnish Production Clubs,* v. 28, Feb. 1956, p. 93-111.

Review of present knowledge of paint films as revealed by electron microscope. Two-stage polyvinyl alcohol-silica replication technique. Chalking of paint due to natural weathering and to ultraviolet radiation. Micrographs. 23 ref. (L26, M21)

351-L. Effect of Gamma Radiation on the Stress-Strain Properties of Unpigmented Soya Alkyd Resin Wet Films. L. L. Carrick and George C. Sun. *Paint and Varnish Production,* v. 46, Feb. 1956, p. 30-33, 91.

Gamma radiation has little effect on the physical properties but moderately reduces the induction drying period of wet films. Maximum and breaking loads occurred at nearly the same elongation value. Graphs, table. 4 ref. (L26, Q25)

352-L. Chlorinated Rubber Paints. F. K. Shankweiler. *Paint and Varnish Production,* v. 46, Mar. 1956, p. 27-32, 75.

Comparison of the principal properties of natural rubber and chlorinated rubber. Film properties, modifiers, metal preparation, film thickness and the cost of applying paints. Photographs, tables. (L26)

353-L. The Effect of Impact Tests on Life of Paint Systems. Max Kronstein and W. H. Kapfer. *Paint and Varnish Production,* v. 46, Mar. 1956, p. 33-47, 82.

New methods for the evaluation of the effect of impact tests on the life of paint systems over metal phosphate treatments on steel. Diagrams, graph, photograph, micrographs, tables. 4 ref. (L26, ST)

354-L. What to Expect From Internal Coatings. J. C. Watts. *Pipe Line Industry,* v. 4, Mar. 1956, p. 20-23.

Application, costs, performance, future prospects for internal coatings of pipe lines. Photographs, tables. 5 ref. (L26)

355-L. 12 Musts for a Good Pipe Coating Job. Marshall E. Parker. *Pipe Line Industry,* v. 4, Mar. 1956, p. 31-34.

Considerations to watch for, starting with storage and handling of materials, continuing during actual application, and including handling of coated pipe until it is in the ditch and backfilled. Photographs. (L26)

356-L. Tropical Deterioration of Automobile Paint Finishes. A. J. Birch. *Products Finishing,* v. 9, Jan. 1956, p. 50-64.

Analyzes tropical breakdown in detail, compares it with accelerated test results, describes some advances in tropical testing. Micrographs, photographs. (L26)

357-L. Temporary Protection Coatings. I. Metallic Naphthenate Solutions. E. Strong. *Products Finishing,* v. 9, Feb. 1956, p. 65-83.

Available temporary coatings for protecting raw material and fabricated parts in manufacturing and assembly, desirable qualities and a consideration of the possible applications of metallic naphthenate solu-

tions. Diagrams, graphs, micrographs, photographs, tables. (To be continued.) (L26)

358-L. Pickling Processes Reviewed. IV. Treating Heat Resistant and Corrosion Resistant Metals. D. J. Fishlock. *Products Finishing,* v. 9, Feb. 1956, p. 84-97.

Concerned with the treatment of stainless steels and various nonferrous alloys. Photographs. (To be continued.) (L12, SS)

359-L. New Markets and Techniques for Precious Metal Electroplates. Alfred M. Weisberg. *Products Finishing,* v. 20, Feb. 1956, p. 26-32.

Applications of gold alloys, rhodium, platinum and palladium in electronic and industrial decorative industries. Plating methods and equipment. Photographs.
(L17, T1, Rh, Au, Pd, Pt)

360-L. Preparing and Painting Zinc Surfaces. Ernest W. Horvick. *Products Finishing,* v. 20, Feb. 1956, p. 36 + 7 pages.

Choice of finishing material, methods of cleaning metal surface, chemical and mechanical pretreatment, baking temperatures, protective films. Photographs, tables.
(L26, L12, Zn, Cr)

361-L. Automation in a Job Shop. Ezra A. Blount. *Products Finishing,* v. 20, Mar. 1956, p. 20-27.

Combination of automatic barrel finishing and barrel plating operations is used in converting rough, rusty, scale-containing steel parts to smooth, brilliant gold and rhodium plated ones at the rate of five tons per day. Photographs, diagram. (L17, ST, Au, Rh)

362-L. Form the Product After It's Finished. Frank Chatterton. *Products Finishing,* v. 20, Mar. 1956, p. 34-38.

Outstandingly tough coatings are applied to metal containers, closures and toys before parts are formed. They are roller coated and printed on flat metal sheets, and baked. Finished parts are then formed and cut in metal stamping dies with no damage to coatings. Photographs. (L26, G3, ST, Al)

363-L. Deposition of Coatings by Electrophoresis. C. Fred Gurnham. *Products Finishing,* v. 20, Mar. 1956, p. 62 + 6 pages.

Theory, applications, advantages, deposition process and aftertreatment. Photograph, micrographs.
(L general)

364-L. Hot-Dip Aluminized Steel. Its Preparation, Properties and Uses. M. L. Hughes. *Sheet Metal Industries,* v. 33, no. 346, Feb. 1956, p. 87-97; disc., 97-98.

Aluminizing of strip wire and fabricated articles; properties of aluminized mild steel; hot-dip galvanizing of other metals and alloys; applications. Micrographs, photographs, graphs, table. 22 ref.
(L16, Al, ST)

365-L. Some Aspects of the Properties and Uses of Electrolytically Coated Sheet Steel. F. H. Smith and T. C. Tapp. *Sheet Metal Industries,* v. 33, no. 346, Feb. 1956, p. 99-106; disc., 106, 113.

Electrotinning and electrozinc coating plants, applications, pretreatment and painting for electrozinc-coated sheets. Photographs, diagrams, tables. (L17, ST, Zn, Sn)

366-L. Modern Painting and Stoving Techniques—With Particular Reference to Flow Coating. J. J. Stordy and W. G. J. Appleton. *Sheet Metal Industries,* v. 33, no. 346, Feb. 1956, p. 115-123.

Dip and spray painting and flow coating techniques. Equipment and procedures for last-named method described in considerable detail. Photographs. (L26)

367-L. Metal Spraying by the Wire Process. H. J. Plaster. *British Welding Journal,* v. 3, Mar. 1956, p. 73-77.

Methods of application, the equipment (hand and automatic), anticorrosive coatings, and building up of worn parts. Photographs. 4 ref.
(L23, ST, Al, Zn)

368-L. Developments in Shot Blasting Strip Steel. K. R. Keska. *Iron and Steel Engineer,* v. 33, Mar. 1956, p. 65-72.

Indications show that shot blast cleaning equipment has a very definite place, particularly on hot rolled pickled steel, which is to be later coated with paints, oxides or metallic coatings. Photographs, diagrams.
(L10, ST)

369-L. A New Development in Metal Cladding. George Durst. *Journal of Metals,* v. 8, Mar. 1956, p. 328-333.

Standard simultaneous application of heat and pressure in the bonding process has been separated into two separate operations to produce a new cladding process. Photographs. 10 ref. (L22)

370-L. Some Tips on Electroforming. Marv Rubenstein. *Metal Finishing,* v. 54, Mar. 1956, p. 56-59.

Materials and design of mandrels, mechanical, chemical and fusible-

metal films as parting media, racking and jigging methods. Photographs, diagrams. (To be continued). (L18)

371-L. Further Studies in Heavy Rhodium Plating. H. J. Wiesner and H. A. Meers. *Plating,* v. 43, Mar. 1956, p. 347-355.

Quality control program instituted to minimize rejects due to plating, stress measurements and other tests, effects of inorganic additives in rhodium baths, phenol sulfonic acid as an addition agent in rhodium sulfate solutions. Graphs, photographs, tables. 6 ref. (L17, Rh)

372-L. Ultrasonic Cleaning. Frank Hightower. *Plating,* v. 43, Mar. 1956, p. 358-362.

Ultrasonic techniques applied to usual cleaning baths, thereby improving performance so as to do same job with fewer cleaning stages or shorter cycle. Also makes it possible to clean inside hollow parts and deep recesses without hand brushing or swabbing. Description of some new transducers which operate in water and in water solutions of detergents or alkaline cleaners. Diagrams, graphs, photographs. (L10)

373-L. (German.) **Distortions and Stresses in a Cast Iron Enamelled 6000-Liter Stirred Reaction Vessel.** L. Weiss, P. Gayer, and G. Matz. *Chemie-Ingenieur-Technik,* v. 28, no. 1, Jan. 1956, p. 31-39.

Extensive expansion measurements with electrical expansion indicators were conducted on cast iron and enamel to determine distortions and stresses which occur. Such calculations permitted, for the first time, a comparison of the cast iron and enamel distortions resulting from an increase of the internal pressure. Graphs, diagrams, tables, photographs. 10 ref. (L27, Q25, CI)

374-L. (German.) **Evaporation of Very Thin Copper and Silver Layers.** Ottmar Knacke and Rudolf Schmolke. *Zeitschrift für Metallkunde,* v. 47, no. 1, Jan. 1956, p. 22-24.

Copper and silver layers on tungsten show a supernormal evaporation rate and thicknesses below 0.1 to 0.2 μ cannot exist above 943 and 775° C., respectively. Gold shows the same behavior. Table, graphs, diagram. 10 ref. (L25, Ag, Au, Cu)

375-L. (German.) **Internal Stresses in Galvanic Copper Deposits.** Hellmuth Fischer, Peter Huhse and Franz Pawlek. *Zeitschrift für Metallkunde,* v. 47, no. 1, Jan. 1956, p. 43-49.

Internal stresses in galvanic deposits of copper determined by magnetic and mechanical methods in relation to inhibitor concentration. A closely related variation of stress, hardness and texture observed with β-napthoquinoline. Graphs, diagrams, micrographs. 7 ref. (L17, Q25, Cu)

376-L. (Polish.) **Phosphatizing of Wires and Bars Before Cold Drawing, and Its Importance for the Wire-Drawing Industry.** Leszek Kus. *Hutnik,* v. 22, no. 9, Sept. 1955, p. 318-324.

Preparation of surface for coating by degreasing, pickling or mechanical cleaning. Phosphate coating facilitates drawing, protects against corrosion or serves to insulate at low voltages. Chemical compositions of phosphate preparations. Techniques and apparatus for phosphatizing. Tables, micrographs, photograph. 7 ref. (L14, F28)

377-L. (Polish.) **Red-Lead Paints and a Quick Method for Their Evaluation.** Z. Klonowski and M. Knopf. *Przemysl Chemiczny,* v. 12, no. 1, Jan. 1956, p. 43-47.

Rapid potentiometric method for ascertaining the protection value of these paints. Linseed oil and low red lead paints tested in various media. Diagrams, graphs. (L26)

378-L. (Polish.) **Surface Treatment of Aluminum and Its Alloys.** Karol Körner. *Technika lotnicza,* v. 11, no. 1, Jan. 1956, p. 18-22.

Stages and variations of the anodizing process. Hardness, thickness, porosity, color, insulative ability and corrosion resistance of anodic films. Electropolishing chemical-conversion coatings compared with anodizing results. Tables, photographs. 14 ref. (L19, Al)

379-L. (Russian.) **Grinding and Polishing of Ceramic Alloys.** V. A. Shal'nov. *Stanki i Instrument,* v. 27, no. 1 Jan. 1956 p. 26-28.

Effect of microstructure grain size, hardness of grinding wheel, rate of feed and depth of layer to be ground off. Results compare with diamond and silicon-carbide polishing. Comparison of polishing of structural steels and ceramic alloys. Graphs, diagrams, photograph. (L10)

380-L. (Russian.) **Wear-Resistance of Coatings Used in the Repair of Machine Parts.** V. I. Kazartsev. *Vestnik mashinostroeniia,* v. 36, no. 1, Jan. 1956, p. 63-66.

Coating with smooth or porous

chromium; hard-facing with electrolytic iron-plating; variations in heat treatment and in preparation of surface. Tables, graph, diagrams. (L17, L24, Q9, ST)

381-L. (Russian.) **Metallizing, by the Spray Method, in the Repair of Equipment.** A. M. Edel'son. *Vestnik mashinostroeniia,* v. 36, no. 1, Jan. 1956, p. 66-67.

Advantages, economy and techniques of repairing wire-drawing band surfaces by metallizing, rather than by dechromizing and rechromizing. Diagram. (L23)

382-L. (Russian.) **Electro-Chemical Tinning of Iron Sheets in Chloride Solutions.** V. P. Kochergin, T. A. Nimvitzkaia and M. Ia. V'iunova. *Zhurnal Prikladnoi Khimii,* v. 29, no. 1, Jan. 1956, p. 59-63.

Tinning from acid solutions produces porous, lusterless surfaces on cold rolled iron sheet; however, tinning from acid solutions of sheet previously treated in basic tin solution, at a cathode current density of 1 to 2 amp. per sq.dm., gives a bright surface and very low porosity. Graphs. 14 ref. (L17, Sn)

383-L. Notes on Experiments in Electrodeposition With Perfluorinated Acids. John K. Taylor and Abner Brenner. *American Electroplaters' Society, Proceedings,* v. 42, 1955, p. 13-14.

Two acids, in particular, were studied in a chromium plating bath and deposits obtained from nickel baths, which contained only the salts of these acids, were studied. Tables. (L17, Cr, Ni)

384-L. Tripoli as an Abrasive in the Development of Buffing Compounds. James Badaluco. *American Electroplaters' Society, Proceedings,* v. 42, 1955, p. 67-69.

Occurrence, mining and properties of tripoli which make it invaluable to the buffing compound industry; specifications and laboratory control in making economical and efficient compositions. Photographs. (L10)

385-L. A Nonoxidizing Heat Test for Plating Adhesion. I. Wm. Marcovitch. *American Electroplaters' Society, Proceedings,* v. 42, 1955, p. 81-82.

A method that does not oxidize the surface in the use of hot fat or oil normally used to flow tin or tin-lead alloy coatings. 4 ref. (L17)

386-L. Phosphate Coating of Metal Surfaces for Industrial Use. W. R. Cavanagh and R. C. Gibson. *American Electroplaters' Society, Proceedings,* v. 42, 1955, p. 100-106.

Factors involved in phosphate coating of steel; phosphate coatings serve as a corrosion protection, as a base for paint, as an aid in the cold forming of metals, and to reduce wear. Micrographs, table. 17 ref. (L14, ST)

387-L. Some Aspects of Solution Level Control. John W. Holland, Loren Stevens and Nello Arterburn. *American Electroplaters' Society, Proceedings,* v. 42, 1955, p. 142-145.

Emphasizes the many relations of solution level control and reviews some of the methods employed to accomplish better control. Diagrams. (L17)

388-L. Electrolytic Coatings on Magnesium Base Alloys From Alkaline Chromate Solutions. Fielding Ogburn, Harry I. Salmon and M. L. Kronenberg. *American Electroplaters' Society, Proceedings,* v. 42, 1955, p. 185-188.

A low-voltage alkaline chromate process which produces a protective coating on magnesium alloys comparable to the coatings produced by the acid chromate and HAE processes. Tables. 2 ref. (L17, Mg)

389-L. Job Plating Shop Costs and Their Relationships to Pricing. Arthur G. Pierdon. *American Electroplaters' Society, Proceedings,* v. 42, 1955, p. 225-227.

Reviews the many expenses encountered in operating a job plating shop by using the results of a cost survey made by the National Association of Metal Finishers; suggests a simple method for rapidly determining whether the sale price on an individual order has yielded a profit. (L17)

390-L. Purchasing Problems of a Manufacturer of Metal Finishing Equipment. E. M. Close. *American Electroplaters' Society, Proceedings,* v. 42, 1955, p. 228-230.

Presents to purchasing representatives and technical representatives of the electroplating industry a picture of a few of the problems which are confronted in the procurement of materials for the manufacture of electroplating equipment. (L12, A4, T5)

391-L. Modified Joliot Apparatus for Study of the Electrodeposition of Radioactive Materials. W. H. Power and J. W. Heyd. *Analytical Chemistry,* v. 28, Apr. 1956, pt. 1, p. 523-525.

An apparatus for continuously recording the deposition or dissolution of radio-active material upon a ra-

diation-transparent electrode during potential change. Diagrams, graphs. 3 ref. (L17)

392-L. (German.) **Influence of Anodizing Variables on the Growth and Various Properties of the Oxide Film.** D. Lenz. *Aluminium,* v 32, no. 3, Mar. 1956, p. 126-135.

Optical and chemical properties are deduced from anodizing in sulphuric acid. Processes occurring during anodizing; effect of electrolyte, current density, voltage and temperature on structure of the oxide film, with special reference to the shape and size of the specimens; thickness of the nonporous primary film; dimensions of the oxide cells and of their cup-shaped primary films. Table, graphs, diagrams, micrographs. 14 ref. (To be continued.) (L19, Al)

393-L. (German.) **New Methods for the Cleaning and Degreasing of Aluminum With Solvent Vapor.** *Aluminium,* v. 32, no. 3, Mar. 1956, p. 142-144.

Method and equipment used in the "Fermeco" system of vapor degreasing and its fields of application. Diagram, photograph. 2 ref. (L12, Al)

394-L. (German.) **Adhesion of Iron-Saturated Zinc Melts on Carbon Iron (Steel).** Dietrich Horstmann. *Archiv für das Eisenhüttenwesen,* v. 27, no. 2, Feb. 1956, p. 85-93.

Time and temperature effect of iron-saturated zinc-melts on iron with a carbon content ranging up to 2.08%. Tables, graphs, micrographs. 11 ref. (L16, Fe, Zn)

395-L. (German.) **Black Spots in Galvanized Coatings.** H. Bablik, F. Götzl and E. Nell. *Metalloberfläche,* v. 10, no. 2, Feb. 1956, p. 33-34.

Effect of aluminum in the flux on black stains in the coating. Counter-measures to prevent formation of spots. Micrographs. (L16, Zn)

396-L. (German.) **Growth of Galvanic Deposits. X. Gold-Copper Alloys.** E. Raub and F. Sautter. *Metalloberfläche,* v. 10, no. 3, Mar. 1956, p. 65-72.

Growth and properties of deposited gold-copper alloys; effect of cyanide content on electrolytic deposition of copper in cyanide baths; deposit of gold-copper alloys from low pH baths or low cyanide content; mixed crystals between gold and copper in deposits. Tables, graphs. 8 ref. (L17, Au, Cu)

397-L. (German.) **Hardness Determination With Small Loads. II. Fundamentals and Influences of the Measurement.** H. Wiegand, M. Koch, and H. J. Meyer. *Metalloberfläche,* v. 10, no. 3, Mar. 1956, p. 73-75.

Preparation of specimens; effect of mechanical and electrolytic polishing on the measurement of etched samples. Graphs, micrographs. 12 ref. (L10, L13, Q29, Al, Cu)

398-L. (Russian.) **The Mechanism of the Surface Saturation of Iron and Steel With Bromine.** G. V. Samsonov and N. Ia. Tseitina. *Fizika metallov i metallovedenie,* v. 1, no. 2, 1955, p. 303-306 + 1 plate.

Depth of saturated layer in relation to time and temperature of treatment; relation of hardness to temperature; microstructure and heat-resistance of bromine-saturated layers. Tables, graphs, micrographs. 10 ref. (L15, R6, Q29, M27, ST, Br)

399-L. (Book.) **American Electroplaters' Society, Proceedings,** (Annual Volume), v. 42, 1955, 255 p. American Electroplaters' Society, 445 Broad St., Newark 2, N. J.

A compilation of 53 papers covering various aspects of electroplating. Papers separately abstracted. (L17)

400-L. (Book.) **Handbook of Barrel Finishing.** Ralph Enyedy. 255 p. 1955. Reinhold Publishing Corp., 430 Park Ave., New York 22, N. Y.

Discusses finishing departments, layouts, finishing compounds and equipment used in barrel finishing; basic types of finishing methods. Diagrams, photographs. (L10)

401-L. (Book.) **Finishing Handbook and Directory. 1956.** I. S. Hallows, editor. 489 p. 1956. Sawell Publications Ltd., 4 Ludgate Circus, London, E. C. 4, England.

Types of paints, lacquers and varnishes. Sections appearing for the first time include curing faults in electroplating baths and treatment of electroplating wastes. (L general)

402-L. Properties of Evaporated Metal Films Related to Their Use for Surface Temperature Measurement. Theodore B. Simpson and Charles C. Winding. *A. E. Ch. E. Journal,* Mar. 1956, p. 113-117.

An extension of the understanding of properties of films on glass surfaces has permitted the fabrication of film-resistance thermometers with accuracies as high as 0.01° C. Tables, graphs. 15 ref. (L25, T8)

403-L. Copper Plating With Chemicals on Zinc, Steel and Aluminum. George W. Jorgensen. *American Pressman,* v. 66, Apr. 1956, p. 12, 14.

A new technique performed by

applying a copper plating solution to the plate after it has been deep-etched and washed with alcohol. The solution is swabbed over the plate for 3 to 5 min. during which time it chemically plates the image with a thin film of copper. (L17, Cu)

404-L. Electroless Nickel Plating. J. L. Chinn. *Automotive Industries,* v. 114, Apr. 15, 1956, p. 66 + 4 pages.

Process, advantages, applications, design factors and cost considerations. Tables. (L14, Ni)

405-L. Report on Epoxy Resins. *Corrosion,* v. 12, Apr. 1956, p. 187-190.

Application of epoxy resin coatings; coverages; surface preparation; primers; physical properties. Tables. (L26)

406-L. Etching Silver With Chromium Trioxide-Sulfuric Acid Solution. Philip F. Kurz. *Electrochemical Society, Journal,* v. 103, Apr. 1956, p. 257.

Details of procedure to alter the surface of silver to provide a substrate suitable for subsequent surface treatment. Table. (L12, Ag)

407-L. Deposition Conditions and Structure of Compact Metal Electrodeposits. I. Copper Electrodeposits Within the F.T. and U.D. Type Range. J. Elze. *Industrial Finishing,* v. 9, Mar. 1956, p. 438 + 5 pages.

Previously abstracted from original. See item 681-L, 1954. (L17, M27, Q29, Cu)

408-L. Cleaning and Phosphatizing Steel Drums to be Painted. J. M. Raineer. *Industrial Finishing,* v. 32, Apr. 1956, p. 70, 72, 76.

"Jalizing" produces a drum that is completely laundered and dries with a protective coating which increases the adherence and durability of paint surfaces. Photographs. (L12, L14, CN)

409-L. Rubber-Modified Alkyd Sealers for Castings. O. L. Campbell. *Materials & Methods,* v. 43, Apr. 1956, p. 130-131.

These newer finishes have better weather resistance and a lower cost. (L26, CI)

410-L. Some Tips on Electroforming. Marv Rubinstein. *Metal Finishing,* v. 54, Apr. 1956, p. 58-60.

Typical applications in making phonograph record matrices, embossing plates, diamond drills, injection molds and resizing worn components. Photographs. 34 ref. (L18)

411-L. Chromate Conversion Coatings for Copper Alloys. R. Stricklen and E. L. Gabel. *Metal Progress,* v. 69, Apr. 1956, p. 93-96.

A new series of balanced chromate solutions will produce a protective mirror-bright finish on copper and most of its alloys. Chromium can be plated directly to these coatings without an intermediate layer of nickel. Photographs. (L14, Cu)

412-L. Vacuum Metalizing.—A New Development. J. Gordon Seiter. *Plating,* v. 43, Apr. 1956, p. 484-489.

Principles of the process, proper lacquering techniques, equipment required, production cost, advantages and limitations. Photographs. (L25)

413-L. Chromium Plating on Tin-Base Die Castings. *Tin and Its Uses,* 1956, no. 34, p. 4, 16.

Method for preparing and nickel plating die castings made from an alloy of 90% tin, 8½% antimony, 1½% copper so that peeling of chromium plating is prevented. (L17, Sn, Cr, Ni)

414-L. Pretreatment of Uranium for the Application of Ceramic Coatings. C. W. Krystyniak and D. D. Crooks. *U. S. Atomic Energy Commission, Research and Development Report,* KAPL-1340, May 1955, 14 p.

Electropolishing, employing ethylene glycol-ethyl alcohol-phosphoric acid, is a reliable basis for air-firing ceramic coatings. Photographs. (L13, L27, U)

415-L. Plutonium Electropolishing Cell. K. S. Bergstresser. *U. S. Atomic Energy Commission, Research and Development Report,* LA-1106, June 1950, 8 p.

Improvements in apparatus and procedure used in the preparation of bright-surfaced samples of plutonium metal for analytical purposes. Photograph. 1 ref. (L13, Pu)

416-L. Mechanical Descaling of Wire Rod. Clemens H. Eisenhuth. *Wire and Wire Products,* v. 31, Apr. 1956, p. 421-425, 468-470. (Condensed from *Stahl und Eisen,* v. 75, no. 17, Aug. 25, 1955, p. 1092-1099.)

Previously abstracted from original. See item 666-L, 1955. (L10, ST)

417-L. Effect of Liquid Honing Upon the Service Performance of Steel. E. A. Satel and M. A. Elizavetin. *Henry Brutcher Translation No.* 3607, 11 p. (From *Vestnik Mashinostroeniya,* v. 35, no. 2, 1955, p. 51-55.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 255-L, 1955. (L10, ST)

418-L. Electrodeposition of Lead-Tin Alloys. E. Raub and W. Blum. *Henry Brutcher Translation No.* 3631, 11 p. (Abridged from *Metalloberfläche,* v.

9, no. 4, 1955, p. 54A-57A.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 413-L, 1955. (L17, Pb, Sn)

419-L. (Czech.) **Contribution to the Metallography of Zinc Coatings and to Some of Their Faults.** Josef Teindl and Vilém Weniger. *Hutnické Listy,* v. 11, no. 3, Mar. 1956, p. 160-164.

Some faults (zinc peeling, zinc flow down and tearing, development of black spots and of stripes on the sheet, and granular appearance of the coating) investigated by metallography. Diagrams, photographs, micrograph. 20 ref. (L16, M general, Zn)

420-L. (German.) **Influence of Anodizing Variables on the Growth and Various Properties of the Oxide Film.** D. Lenz. *Aluminium,* v. 32, no. 4, Apr. 1956, p. 190-201.

Factors which determine the chemical stability of the film, such as the nature of the corroding medium, the material, the film structure and thickness and sealing; compares bohmite films with anodically produced oxide films. Photographs, graphs, table, micrographs. 23 ref. (L19, Al)

421-L. (German.) **Painting of Steel Structures in Iron and Steel Works.** Lorenz Bierner. *Stahl und Eisen,* v. 76, no. 6, Mar. 22, 1956, p. 335-344.

Factors which determine the life of a paint coat, influence of prescription of definite paint formulas on quality of the paint coat. Graphs, table. (L26, ST)

422-L. (Russian.) **Uses of Oxide Coatings for Electrotechnical Sheet Steel at the Kharkov I. V. Stalin Electromechanical Plant.** Ia. I. Kagan. *Fizika metallov i metallovedenie,* v. 1, no. 2, 1955, p. 374-378.

Oxide coating acts as an insulator film and improves the magnetic properties of steel, cold worked by stamping. Change in coercive force with oxidizing temperature, other relations. Graphs, table. (L14, A5, P16, ST)

423-L. (Spanish.) **Concerning "Pitting" of the Electropolished Surface of Steels.** José Ibarz Aznarez and Sebastian Feliu Matas. *Revista de Ciencia Aplicada,* v. 10, no. 48, Feb. 1956, p. 22-29.

Studies of pitting associated with bubbles occurring on metal surface. Effect of carbide inclusions. Micrographs, diagrams. 6 ref. (L13, R5, ST)

424-L. The Cladding of Zirconium. H. A. Saller, J. R. Keeler and E. R. Szumachowski. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* BMI-717, Dec. 1951, 13 p.

Zirconium was roll clad with nickel, monel, inconel, titanium and an 18-8 stainless steel. With the exception of titanium, all of these metals formed compounds at the zirconium interface and the resulting bonds had poor mechanical properties. Sandwich-type diffusion couples of zirconium with copper, molybdenum, platinum, silver and tantalum indicated that all of these metals formed hard, brittle diffusion products with zirconium. Micrographs. (L22, Zr)

425-L. Electroplating on Zirconium Using Replacement Indium Deposits. W. C. Schickner, J. G. Beach and C. L. Faust. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* BMI-809, Feb. 1953, 15 p.

Nickel plated on replacement-indium-coated zirconium has as-plated adhesion of about 18,000-psi. modulus of rupture. This bond strength is better than the 6000 psi. for as-plated adhesion of nickel on etched zirconium, but is inferior to the 50,000-psi. alloy-bonded nickel (by heat treatment) on etched zirconium. (L17, In, Zr)

426-L. Theory and Practice in Dyeing & Sealing Anodised Aluminum. C. T. Speiser. *Electroplating and Metal Finishing,* v. 9, Apr. 1956, p. 109-116, 128.

Absorption and fixation of dyestuffs; various sealing processes. Diagrams, tables, graphs. 28 ref. (L19, L14, Al)

427-L. A Theory of Adherence of Vitreous Enamels to Aluminium. E. C. Subbarao. *Journal of Scientific & Industrial Research,* v. 15, sec. B, Mar. 1956, p. 150-154.

The surface of an aluminum alloy at various stages of processing and the intermediate layer between the enamel and the metal studied by electron microscopy, X-ray diffraction and X-ray spectroscopy. Photographs, tables. 7 ref. (L27, Al)

428-L. Bright Copper Plating. E. Lutter. *Metal Industry,* v. 88, Apr. 6, 1956, p. 267-269.

Survey of development and present position of bright copper plating. Decision to use this process depends on shape of parts to be plated, nature of basis metal, degree of corrosion protection and surface finish desired. (To be continued.) (L17, Cu)

429-L. Bright Copper Plating. E. Lutter. *Metal Industry,* v. 88, Apr. 13, 1956, p. 293-294.

Precautions necessary to prevent formation of rough deposits; filtering, current reversing, brightening agents; direct nickel plating and plating zinc die-castings. (L17, Cu)

430-L. Carbon Arc Blast Smooths Rough Surfaces. Frank Newberry. *Modern Castings,* v. 29, May 1956, p. 121-122.

Carbon arc-compressed air pad washing reduces grinding and cleaning costs in finishing department of steel foundry. Photographs. (L10, CI)

431-L. Chemical Protective Treatment for Tinplate. Ernest S. Hedges. *Sheet Metal Industries,* v. 33, no. 347, Mar. 1956, p. 173-175, 178.

The chemical treatment, when suitably applied, protects tinplate from blackening by sulfur-bearing products, delays the onset of rusting, provides good base for coating of lacquer or paint. Graph, photographs. (L14, Sn)

432-L. (Russian.) **Periodic Variation of Cathodic Polarization During the Electrodeposition of Lead in the Presence of Surface-Active Substances.** D. N. Gritsan and D. S. Shun. *Doklady Akademii Nauk SSSR,* v. 106, no. 6, Feb. 21, 1956, p. 1035-1038.

Fluctuations in potential explained by the adsorption mechanism underlying the effect of surface-active substances on electrode processes. Graphs, micrograph. 34 ref. (L17, Pb, Cd)

433-L. (Russian.) **Investigation of Cathodic Sputtering in the Near Threshold Region. I.** N. D. Morgulis and V. D. Tishchenko. *Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki,* v. 30, no. 1, Jan. 1956, p. 54-59.

Labelled atoms used to investigate sputtering and to determine magnitude of the sputtering threshold energy. Experimental study using labelled cobalt. Table, graphs. 10 ref. (L25, Co)

434-L. (Spanish.) **Concerning Certain Anomalies in Electrolytic Polishing. I. Crystallizations on Surfaces Polished With Phosphoric Acid and a Mixture of Citric and Sulfuric Acids. II. Patterns and Undulations on Polished Surfaces With Acetic-Perchloric Mixture.** Sebastian Feliu, Manuel Serra and José Antonio Boned. *Instituto del Hierro y del Acero,* v. 9, no. 43, Feb. 1956, p. 213-221.

Crystallization appears under certain conditions developing in electrolytic baths during polishing of steel. Discontinuities in the crystals are evidence of a periodic phenomenon in the electrolytic process. Study of patterns appearing on surface of electrolytically polished steel, possibly due to supersaturation with metallic salt at the anode. Micrographs. 4 ref. (L13, M27, ST)

435-L. Ultra-Modern Production Lines for Steel Drums. *Finish,* v. 13, May, 1956, p. 27-30.

Utilizing principles of automation in manufacturing, 600 lithographed 55-gal. drums are produced hourly in a semi-automatic production system. Photographs. (L26, CN)

436-L. How You Can Brighten Stainless Steel Parts by Electropolishing. W. E. McFee. *Finish,* v. 13, May, 1956, p. 44-46.

Economies of electropolishing in particular cases. Diagrams, graph, photograph. (L13, SS)

437-L. Anodized Aluminum: Rainbow Hues Have "Pot-o'-Gold" Future. W. G. Patton. *Iron Age,* v. 177, May 3, 1956, p. 95-97.

Automobiles, trains, buses, appliances, housewares and buildings find new customer appeal in bright-colored components. New anodizing techniques create finishes that are more resistant to heat, erosion and corrosion .Photographs. (L19, Al)

438-L. Metal Finishing Equipment and Processes. J. L. M. Fletcher. *Metal Industry,* v. 88, Apr. 20, 1956, p. 321-325.

Equipment and processes which have become available in the last 12 months. Progress in automatic electroplating plant, plating barrels, tumbling barrels, liquid abrasive blasting, pickling, bright dipping, new plating processes. Photographs. (L general)

439-L. The Development of Zirconium-Rich Protective Coatings and Brazing Materials for Heat-Resisting Alloys. Alan Blainey. Paper from "Symposium on Metallic Materials for Service at Temperatures Above 1600° F". American Society for Testing Materials, p. 183-193.

Demonstrates feasibility of producing hard protective coatings of zirconium-rich alloys on the surface of nickel-base alloys and heat-resisting steels. Zirconium alloys show promise as high-temperature brazing materials. Diagrams, micrographs, photographs, tables. 6 ref. (L16, K8, Zr, Ni, SG-h)

440-L. (German.) **Immersion Aluminum Coating of Iron and Steel Parts.** P. Douady. *Aluminium Suisse,* v. 6, no. 2, Mar. 1956, p. 65-71.

Composition of baths. Equipment

and operating procedures. Tables, photographs, micrographs. (L16, Al, ST)

441-L. (German.) **Mechanism of Electrolytic and Chemical Polishing of Metals, Especially of Nickel.** Willi Machu and Adly Ragheb. *Zeitschrift für Metallkunde,* v. 47, no. 3, Mar. 1956, p. 176-183.

Formation and porosity of oxide layers formed during polishing treatments. Effects of solution concentration and current density on resultant surface smoothness. Graphs, tables. 14 ref. (L12, L13, Ni)

442-L. Electroplating on Beryllium. J. G. Beach and C. L. Faust. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* BMI-732, Apr. 1952, 46 p.

One method involves electrochemical and chemical activation of the beryllium surfaces for direct plating with metals, the other involves the application of a replacement film of zinc on the beryllium surfaces followed by strike plating with copper or nickel from baths suitable for plating on zinc. Diagram, graph, tables, micrographs. 7 ref. (L17, Be)

443-L. Electroplating on Zirconium and Zirconium-Tin. W. C. Schickner, J. G. Beach and C. L. Faust. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* BMI-757, July 1952, 17 p.

Methods for producing nickel and other coatings by combining electroplating procedures with diffusion heat treatment. Table. 2 ref. (L17, L15, Sn, Zr)

444-L. Bismuth-Alloy Coatings on Aluminum. H. A. Saller, J. R. Keeler, D. L. Keller and J. G. Beach. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* BMI-835, May 1953, 23 p.

Several methods for obtaining a 0.004-in. thick high-bismuth alloy layer on the flat surface of an aluminum target. Best results obtained by electroplating alternate layers of nickel and bismuth, followed by diffusion heat treatment. Graph, micrographs, photographs, tables. (L17, L15, Bi, Ni, Al)

445-L. Recent Navy Experience With Saran and Vinyl Coatings. W. W. Cranmer. *Corrosion,* v. 12, May 1956, p. 245-246.

Use of the materials justified in cases where a heavy duty coating resistant to fuels and salt water was necessary and short periods of moderately elevated temperatures were to be encountered. In addition to reducing corrosion, use of the coating simplified cleaning of tanks. 1 ref. (L26, R4)

446-L. Calcium Plumbate. A Post-War Development in Anti-Corrosive Paint Pigments. N. J. Read. *Corrosion Technology,* v. 3, Apr. 1956, p. 119-123.

Like red lead it provides protection by a combination of basic and oxidizing characteristics, as well as film-forming properties by interaction with linseed oil. Photographs, tables. 2 ref. (L26)

447-L. Porcelain Enamel Manufacturing Processes. G. H. McIntyre. *Industrial Finishing* (London), v. 9, Apr. 1956, p. 492-495.

Porcelain enameling practices with the primary aspects of the manufacturing steps. Tables. 4 ref. (L27)

448-L. Anti-Fouling Paint Studies. J. B. Ballentine, W. H. Stewart, Marvin O. Yeiter and A. L. Alexander. *Industrial Finishing* (London), v. 9, Apr. 1956, p. 497-499, 501-503.

Investigation of inherent errors in leaching rate measurements. Tables. (L26)

449-L. Protection Against Corrosion. II. The Ground Metal and Its Coating. P. Morisset. *Industrial Finishing (London),* v. 9, Apr. 1956, p. 507-510.

Shows that a metallic coating only has significance if its thickness is specified. Anodic and cathodic coatings, as well as the various factors promoting a good corrosion resistant coating are covered. Diagrams, graphs. 5 ref. (L19, L21, R general)

450-L. Surface Treatment and Finishing of Light Metals. VIII. Hard Anodizing. S. Wernick and R. Pinner. *Metal Finishing,* v. 54, May 1956, p. 52-55.

Hard anodizing is an alternative to hard chromium plating; it has made possible the use of aluminum alloys in such components as pistons, cylinders and cylinder liners, hydraulic equipment, buffers, gas-turbine engine components and gears. Production methods for thick and hard anodic coatings. Diagrams, graphs. (To be continued.) (L19)

451-L. Conversion Coatings for Titanium. P. D. Miller, R. A. Jefferys and H. A. Pray. *Metal Progress,* v. 69, May 1956, p. 61-64.

Both conversion and anodic coatings on titanium alloys hold lubricants efficiently and eliminate or reduce galling in forming operations and in applications involving metal-to-metal contact. Graphs, tables. (L14, Ti)

452-L. Controlled Sputtering of Metals by Low-Energy Hg Ions. Gottfried K. Wehner. *Physical Review,* v. 102, ser. 2, May 1, 1956, p. 690-704.

Sputtering studied under well-controlled conditions by immersing the target in a low-pressure mercury plasma of high density created in a pool-type vacuum arc. Diagrams, graphs, micrographs, photographs, table. 28 ref. (L25, Hg)

453-L. Chromizing of Powder Metallurgy Products (Sinterings). Richard P. Seelig and Richard L. Wachtell. *Powder Metallurgy Bulletin,* v. 7, Apr. 1956, p. 153-154.

Chromizing, a high-temperature chemical reaction plus diffusion process during which chromium is alloyed with the surface of the part being treated, is finding growing commercial acceptance on wrought, cast and molded ferrous metal parts. Photographs. 1 ref. (L15, H12, Cr)

454-L. Finishing Methods for Aluminum Bronze Gravity Die-Castings. A. C. Street. *Product Finishing,* v. 9, Apr. 1956, p. 48-53.

Composition details, casting problems and corrosion resistance of the alloy; preparatory treatments, painting, bronzing and electroplating; designing for good surface finish. Diagram, photographs.
(L12, L17, L26, Cu)

455-L. Elementary Topics for Research in Metal Finishing. I. Electroplating Pre-treatments. C. James. *Product Finishing,* v. 9, Apr. 1956, p. 54-62.

Research is needed on solvent, aqueous alkali and emulsion cleaning; acid dips and pickles; transfer of the work from cleaning processes to the electrolyte. Graphs, tables. (To be continued.) (L12)

456-L. Pickling Processes Reviewed. VI. Treating Zinc, Cadmium, Magnesium and Aluminium. D. J. Fishlock. *Product Finishing,* v. 9, Apr. 1956, p. 63-70, 112.

Light acid immersion treatments for improving corrosion resistance and surface finish of electroplated zinc and cadmium; preparation of magnesium for painting and electroplating; pickling, cleaning, etching, and polishing aluminum and its alloys. Photographs.
(L12, Al, Zn, Cd, Mg)

457-L. Temporary Protective Coatings. III. Hot Dip Compositions. E. Strong. *Product Finishing,* v. 9, Apr. 1956, p. 71-79.

The use of hot dip wax and plastic compositions for safeguarding small, fragile components against severe mechanical shock. Graphs, tables, diagrams. (To be continued.) (L26)

458-L. (Russian.) **Mechanism of the Electrolytic Deposition of Metal on a Passivated Surface.** L. I. Kadaner and A. Kh. Masik. *Doklady Akademii Nauk SSSR,* v. 107, no. 2, Mar. 11, 1956, p. 276-279 + 1 plate.

Comparison of electrolytic deposition of lead coating on passivated and unpassivated metal surfaces with respect to corrosion resistance. Micrographs, diffractograms, oscillograms. 11 ref.
(L17, R10, Pb, Fe, Cu)

459-L. (Polish.) **Red-Lead Paints and a Quick Method for Their Determination.** Z. Klonowski and M. Knopf. *Przemysl Chemiczny,* v. 12, no. 3, Mar. 1956, p. 151-167.

A quick potentiometric method for determining rust-preventing value of red-lead paints for grounding iron. Tables, graphs, photographs. 12 ref.
(L26, R11, ST)

460-L. (Russian.) **Use of Beryllium Oxide for the Beryllization of Steel.** V. A. Parfenov. *Metallovedenie i Obrabotka Metallov,* no. 3, Mar. 1956, p. 17-19.

Diffusion beryllization of steel is shown to be feasible. Protection against wear and chemical corrosion at high temperatures. Microstructure, depth and hardness of beryllium diffusion layer. Graphs, micrographs, photographs. 4 ref.
(L15, Q9, M26, ST)

461-L. (Russian.) **Oxygen Over-Voltage Tension on Nickel Electrode at High Current Density.** Ia. I. Tur'ian and I. S. Gol'denshtein. *Zhurnal Prikladnoi Khimii,* v. 29, no. 3, Mar. 1956, p. 379-384.

Investigation of the oxygen over voltage on a nickel anode in a 7.5 *N* solution of potassium hydride at high-current density 0.04 to 10 amp. per sq.cm., and at temperatures from 0 to 85° C. Table, graph, diagram. 12 ref. (L17, Ni)

462-L. (Spanish.) **Obtaining Steel Coatings by Chromium Diffusion.** Jose Saenz Insaust. *Instituto del Hierro y del Acero,* v. 9, no. 44, Mar. 1956, p. 250-257.

Method consists in depositing chromium in the gaseous phase on the surface of pieces placed in a chromizing mixture in a closed vessel and heated in a furnace with any heating system. Theory of process and structure of coating obtained. Micrographs, graphs, photographs, diagram. 10 ref.
(L15, ST, Cr)

463-L. (Spanish.) **Contribution to the Study of the Electropolishing of Steel With Alternating Current.** Sebastian Feliu and Manuel Serra. *Instituto del Hierro y del Acero,* v. 9, no. 44, Mar. 1956, p. 325-332.

In baths made up of phosphoric acid mixed with certain organic substances, a study was made of electropolishing steel with alternating current at 50 cycles per sec. Tables, graphs. 10 ref. (L13, ST)

464-L. Chromalloy Surfacing. Edward Magder. *Canadian Metals,* v. 19, May 1956, p. 58, 60.

Chromium diffusion coating procedures, properties of coatings. Micrograph, table. (L15, Cr)

465-L. The Electrodeposition of Tin-Cadmium Alloys From Fluoride-Fluosilicate Solutions. A. E. Davies. *Institute of Metal Finishing, Bulletin,* v. 6, Spring 1956, p. 31-42.

Investigation of the composition of tin-cadmium alloys electrodeposited from electrolytes containing stannous fluosilicate, cadmium fluosilicate, ammonium fluoride and certain nonionic organic compounds. The composition is shown to be a function of current density, cadmium and stannous tin concentration. Table, graphs. 7 ref. (L17, Cd, Sn)

466-L. The Electrodeposition of Tin-Cadmium Alloys From Stannate-Cyanide Solutions. A. E. Davies. *Institute of Metal Finishing, Bulletin,* v. 6, Spring 1956, p. 43-58.

Smooth adherent deposits of tin-cadmium alloys were obtained from hot solutions of sodium stannate, cadmium cyanide, sodium cyanide and sodium hydroxide. Substitution of potassium salts for sodium salts leads to increased cathode efficiency. Graphs, tables. 5 ref. (L17, Cd, Sn)

467-L. The Chemical Treatment of Nickel, Nickel-Chromium and Chrome-Iron Alloy Prior to Electrodeposition. E. Morley. *Institute of Metal Finishing, Bulletin,* v. 6, Spring 1956, p. 59-61.

Reduction by cathodic treatment of the oxide film which is formed when the work has been treated anodically. Tables. (L21, Ni, Cr, Fe)

468-L. Is Tin-Nickel the New Plating Finish You Need? R. T. Gore and F. A. Lowenheim. *Iron Age,* v. 177, May 31, 1956, p. 59-61.

Methods and bath composition for tin-nickel plating, advantages and properties of coatings. Photographs. (L17, Sn, Ni)

469-L. Loss of Water of Hydration From Phosphate Coatings Determined Radiometrically. Stanley L. Eisler, Jodie Doss and W. Dennis McHenry. *Organic Finishing,* v. 17, May 1956, p. 5-9.

Steel specimens were phosphated in each of four different baths containing tritium, and activity measurements were made after heating cycles at various temperatures. Graphs, photograph. 7 ref. (L14, ST)

470-L. Electrophoretic Application of Organic Finishes. J. J. Shyne. *Organic Finishing,* v. 17, May 1956, p. 12-14.

Procedures for electrophoretic deposition of resins from aqueous and nonaqueous suspensions; merits of both types of suspensions. Diagram, graph, table. 17 ref. (L26)

471-L. Industrial Applications for Vinyl Resin Finishes. Frank A. Rideout. *Organic Finishing,* v. 17, May 1956, p. 15-20.

Vinyl copolymer properties; solvents for vinyl coatings; hot spray application of vinyl maintenance paint; plasticizers, pigmentation and primers; dispersion coatings. Table, photographs. (L26)

472-L. Study of Corrosion and Wear Resistance of Calorized Steel. S. G. Bogdanov. *Henry Brutcher Translation No.* 3684, 10 p. (From *Metallovedenie i Obrabotka Metallov,* no. 3, 1955, p. 25-31.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 120-L, 1956. (L15, R5, R3, Q9, ST)

473-L. (Dutch.) **Surface Treatment of Magnesium.** T. v. d. Klis. *Metalen,* v. 11, no. 6, Mar. 1956, p. 133-139.

Standard procedures for cleaning, pickling, protecting and specially treating the magnesium surface. Tables, diagram. (L general, Mg)

474-L. (Finnish.) **Painting of Steel Structures in Industrial Atmospheres.** Veikko Tolvanen. *Teknillisen Kemian Aikakauslehti,* v. 13, no. 5, Mar. 15, 1956, p. 139 + 4 pages.

Corrosion inhibition by the action of red lead, lead cyanamide, zinc chromate and zinc tetra-oxychromate in anticorrosion paints. Paint application, surface preparation, pretreatment, actual painting and requirements to be met by surrounding influences when paint is being applied in industrial areas. (To be continued.) (L26, ST)

475-L. (German.) **Adhesion of Iron-Saturated Molten Zinc to Copper-Containing Iron.** Dietrich Horstmann.

Archiv für das Eisenhüttenwesen, v. 27, no. 4, Apr. 1956, p. 231-233.

Adhesion of iron-saturated molten zinc increases significantly with the copper content in steels. The copper content is of no influence in galvanizing. Table, graphs, micrographs. 6 ref. (L16, Zn, Fe, Cu)

476-L. (Italian.) **Zinc-Powder-Base Antirust Paint for Protection.** Giulio Binetti. *Metallurgia Italiana,* v. 48, no. 3, Mar. 1956, p. 71-86.

Describes paint, its high content of zinc powder, preparation and anticorrosion properties. Photographs, diagrams, graphs. (L26, Fe, Zn)

477-L. Aluminum Paint: The Stability of Leafing. Gunter W. Wendon. *Corrosion Prevention and Control,* v. 3, May 1956, p. 33-37.

Synthetic and natural resins, drying oils, solvents and thinners, driers, bituminous media, and suitability testing, considered in relation to correct manufacture of aluminum paint. 9 ref. (L26, Al)

478-L. Recent Developments in Metal Spraying. *Corrosion Prevention and Control,* v. 3, May 1956, p. 38-42.

Applications, wear resistance, uses, porosity effects, choice of fuel gas, recent specifications. Photographs. 14 ref. (To be continued.) (L23, Al, Zn)

479-L. Corrosion Problems on the Texas Gulf Coast. I. A. D. Rust. *Corrosion Technology,* v. 3, May 1956, p. 134-137.

The painting program at a chemical plant. Table, diagram, photographs. (L26, R3)

480-L. Lanolin—as a Temporary Protective. H. Silman. *Corrosion Technology,* v. 3, May 1956, p. 138-140, 153.

Lanolin is compared with various oils and greases as a rust preventive coating. Photographs, table. 4 ref. (L26)

481-L. An Experimental Investigation of the Metal Spraying Process. A. Matting and K. Becker. *Electroplating and Metal Finishing,* v. 9, May 1956, p. 147-148, 153.

Theory of coating formation. Micrographs. 57 ref. (L23)

482-L. A Manufacturing Development: The Gyrofinishing Process for Polishing Metal Surfaces. George R. Squibb and Fred T. Hall. *General Motors Engineering Journal,* v. 3, May-June 1956, p. 64-68.

Process essentially consists of submerging the parts to be finished in a revolving mass of free abrasive material. Photographs. (L10)

483-L. Protection Against Corrosion. III. The Use of Metallic Coatings. P. Morisset. *Industrial Finishing (London),* v. 9, May 1956, p. 569-574.

Properties of electrodeposited coating metals and conditions under which they are likely to be used. Tables. 4 ref. (L17)

484-L. Developments in Sprayed Metal Coatings. Herbert S. Ingham. *Product Engineering,* v. 27, June 1956, p. 194-197.

Advances in the design of powder spray guns now permit economical spraying of metal alloys and ceramic materials. Comparison of guns, discussion of fusing, properties of alloys sprayed by the new equipment. Photographs, tables, diagrams. (L23, L27)

485-L. Simple, Rapid Sputtering Apparatus. Richard B. Belser and Walter H. Hicklin. *Review of Scientific Instruments,* v. 27, May 1956, p. 293-296.

Description of apparatus which deposits opaque films of nickel and the noble metals in 3 to 10 min. Diagram, table. 20 ref. (L25, Ni, EG-c)

486-L. Metal Spraying With Rockets. J. W. Buffington and J. A. Browning. *Welding Journal,* v. 35, May 1956, p. 468-471.

Rocket metallizer can control average particle size over the range 20 to 200 μ. Propane and similar fuels are used. Micrographs, graphs, diagrams, photographs. (L23)

487-L. Alumina Coating on Ramjet Chamber, Flameholder Beats Heat Barrier. Alan V. Levy. *Western Metals,* v. 14, May 1956, p. 66-67.

Applications and properties of flame-sprayed coating. Photographs, tables. (L27)

488-L. (German.) **Black Stains in Dry Zinc Plating.** K. Zimmermann. *VDI Zeitschrift,* v. 98, no. 12, Apr. 1956, p. 559.

Preparation of flux for galvanizing. Effect of aluminum inclusions. (L16, Zn)

489-L. (Russian.) **Investigation of Chromium-Plating Baths of Combined Type.** N. T. Drobantseva and A. N. Sysoev. *Zhurnal Prikladnoi Khimii,* v. 29, no. 4, Apr. 1956, p. 589-595.

Effect of H_2SiF_6 and other additions to the chromic acid on thickness and texture of chromium deposits. Relation of current density and temperature to yield for standard and combined baths. Diagram, micrographs, graph. 14 ref. (L17, Cr)

490-L. (Book-German.) **Hull Paint and Ship Coating Compounds.** Manfred Ragg. 412 p. 1955. Wilhelm Pansegrau Verlag, Berlin-Wilmersdorf, Uhlandstrasse 102, West Berlin, Germany.

Practical data on ship corrosion, its prevention and causes. Types of antifouling and antiplankton compounds, their substitution, solubility, and analyses, with reference to pontoons, corrosion on ships, docks, buoys, fresh-water ships and so forth. (L26, R4, R10)

491-L. Surface Preparation of Steel. I. Joseph Bigos. *Chemistry in Canada,* v. 8, May 1956, p. 30-34.

Complete descaling by blast cleaning or pickling and a suitable pretreatment is the optimum surface preparation. For mild atmospheres, wire brushing is adequate and economical since intact mill scale under such conditions is a good basis for paint. Tables, photographs. (L10, L26, ST)

492-L. Anodic Oxide Films. V. Kinetics of Formation of Anodic Oxide Films on Niobium. Space Charge and the Tafel Slope Anomaly. VI. Application of Dewald's Theory to Niobium. Lawrence Young. *Faraday Society, Transactions,* v. 52, Apr. 1956, p. 502-521.

Anodic polarization of columbium produces interference-colored oxide films similar to those on tantalum. Film growth involves the passage of a current of metal ions through the film under the influence of the electrostatic field set up in the oxide by the applied voltage. The Dewald theory is considered to account for the anomaly in the temperature dependence of the Tafel slope with tantalum. Graphs, tables, diagrams. 18 ref. (L19, Cb)

493-L. How You Can Blacken Stainless Steel. W. E. McFee. *Finish,* v. 13, June 1956, p. 27-28.

Proper cleaning and immersion in molten bath of dichromates results in a smooth, durable and corrosion resistant oxide film. Photograph, graph. (L14, SS)

494-L. Developments in Scalebreaking and Continuous Pickling Lines. J. I. Greenberger. *Iron and Steel Engineer,* v. 33, May 1956, p. 69-76; disc., p. 76-79.

Application of scalebreaker gives increased productivity with minimum acid immersion length; acid requirements are reduced, strip speeds are increased and costs are reduced; existing lines can be converted to use the equipment. Table, photographs, graphs, diagrams, nomograph. (L10, L12, ST)

495-L. Chemical Polishing of Pure Zinc. J. J. Gilman and V. J. DeCarlo. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, May 1956, p. 511-512.

New polish consists of three chemicals: nitric acid, ethyl alcohol, and hydrogen peroxide. Diagram. 4 ref. (L12, Zn)

496-L. Sublimation Figures in Nickel, Copper, and Zinc. J. C. Danko and A. J. Griest. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, May 1956, p. 515-516.

Sublimation figures on evaporated coatings were cubic for nickel, hexagonal for zinc and circular for copper. Graph, micrographs. 3 ref. (L25, M27, Ni, Cu, Zn)

497-L. New Titanate Coatings. Robert J. Fabian. *Materials & Methods,* v. 43, June 1956, p. 120-122.

Among the advantages of butyl titanate-based paints are excellent heat and corrosion resistance. Graph, table, photographs. 5 ref. (L26, Ti)

498-L. Cost Factors Governing Buff Selection. Edwin Dolye. *Metal Finishing,* v. 54, June 1956, p. 75-76.

Costs of labor, compound, buff, power, supervision and maintenance; machine down time; set-up and break-in time; machine depreciation; fixed overhead; cost of salvaging rejects. Table (L10)

499-L. Surface Treatment and Finishing of Light Metals. VIII. Hard Anodizing. S. Wernick and R. Pinner. *Metal Finishing,* v. 54, June 1956, p. 82-87.

Properties and applications of hard anodic coatings. Micrographs, tables, photographs, graph. 17 ref. (L19, Al)

500-L. Barrel Finishing. Charles E. Kincaid. *Metal Industry,* v. 88, June 1, 1956, p. 458-460.

Principles, grinding compounds, types of media, processing loose parts and multiple compartment barrels. Photographs, diagrams. (To be continued.) (L10)

501-L. Descaling Steel Sheet by Shot-Blasting. Wilhelm Olson. *Metal Progress,* v. 69, June 1956, p. 66-67.

Shot-blast descaling of hot rolled low-carbon steel sheet and strip has not only relieved a procurement problem but has also reduced costs. Photographs. (L10, CN)

502-L. Metallizing. Norman E. Rawson. *Northwestern Engineer,* v. 15, June 1956, p. 18-19, 40.

Development, equipment, operating procedures and applications. Diagram, photograph. (L23)

503-L. Pipe Line Coating Practices. Alex McClure. *Pipe Line News,* v. 28, June 1956, p. 41-42, 44-47.

Some factors associated with the selection and application of pipeline coatings; cost summary. (L26)

504-L. Characteristics of Controlled Rinse Tanks. J. B. Mohler. *Plating,* v. 43, June 1956, p. 732-737.

Solubridge controller reduces water costs. Rapid readings obtained by the conductivity method are used to determine most practical rinse concentrations. Tables, graphs, diagram. 4 ref. (L12, L17)

505-L. How to Buy a Tumbling Barrel. William E. Brandt and David W. Stitely. *Plating,* v. 43, June 1956, p. 738-742.

Recommendations concerning the drum, motor and drive units, shaft, bearing and framework, size, speed and horsepower, safety provisions. Photographs. (L10)

506-L. Polishing and Buffing of Die Castings. *Precision Metal Molding,* v. 14, June 1956, p. 59-63, 65.

Designing for polishing, equipments and materials, recommended cycles. Table, photographs. (L10)

507-L. New Non-Electrolytic Plating Process. *Precision Metal Molding,* v. 14, June 1956, P. 66-68.

Kanigen process deposits a uniform, hard, nonporous coating of nickel-phosphorus on iron, copper or aluminum and their alloys from a chemical bath without the use of electricity. Micrograph, table, photographs. (L14, Ni)

508-L. Plastisol Coating of Wire Products. Gerard H. Poll, Jr. *Product Finishing,* v. 20, June 1956, p. 66-70, 72.

Equipment and operating procedures and fume removal. Photographs. (L26)

509-L. Barrel Finishing Principles. H. Leroy Beaver. *Product Finishing,* v. 20, June 1956, p. 76-78.

Historical outline and types of barrels. (L10)

510-L. Gear "Burring" by "Electrolytic Polishing". I. "Electrolytic Burring" of Aluminium Gears. Masao Naruse and Akira Nannichi. *Technology Reports Tohoku University,* v. 20, 1956, p. 225-233.

Polishing was carried out in phosphoric acid solution of 1.4 density, with the gear as the anode connected in parallel with an aluminum plate cathode. Micrographs, photographs, graphs, diagrams. (L13, Al)

511-L. Metalizing Helps Lick Gulf Coast Corrosion. F. W. Gartner, Jr. *World Oil,* v. 142, June 1956, p. 220, 225.

Excellent protection easily applied at a low cost per year makes metalizing a useful tool in corrosion prevention. Photographs. (L23)

512-L. Automatic Plating Setup Processes Variety of Castings. *Automation,* v. 3, July 1956, p. 52-54.

Cleaning operations, automatic plating equipment and procedures. (L17)

513-L. How We Got Where We Are in Light-Metal Enameling. II. Paul A. Huppert. *Ceramic Industry,* v. 67, July 1956, p. 64-65, 97-98.

An historical review of literature. (To be continued.) (L27, Al)

514-L. Recent Developments in Rubber Lining. R. F. Reynolds. *Chemical & Process Engineering,* v. 37, June 1956, p. 195-198, 210.

Advances in the use of rubber linings for tanks, vessels, pipes and other items of chemical plant. (L26)

515-L. The Cathode Polarization Potential of Silver in Silver Nitrate. I. The Effect of Organic and Inorganic Additives. E. G. Neal and L. L. Shreir. *Faraday Society, Transactions,* v. 52, May 1956, p. 703-712.

An absorption theory explains both the polarization potentials and the mechanism of action of addition agents. (L17, Ag)

516-L. Standardized Barrel Tumbling Pays Off. *Iron Age,* v. 177, June 21, 1956, p. 115-117.

Barrel finishing of small ferrous parts. (L10, SF, CI)

517-L. How to Get More for Your Finishing Dollar. I. Plating. II. Metal Cleaning and Finishing Handbook. *Iron Age,* v. 177, June 28, 1956, p. 98-128.

Management's duties, plant layout and maintenance, product design, water supply, plating wastes. Tabular information to help in selecting, evaluating and specifying the right cleaning or finishing method for a particular use. (L general)

518-L. Barrel Finishing. Charles E. Kincaid. *Metal Industry,* v. 88, June 8, 1956, p. 477-478.

Recommendations for successful finishing. Maximum utilization of process can be secured only on volume production of parts. (L10)

519-L. Lithography on Aluminum Foil. Don Pingree. *Pacific Printer, Publisher, and Lithographer,* v. 94, June 1956, p. 12, 14.

Improvements in foil, ink and laminating process increase applications. (L26, Al)

520-L. Improved Finishes for Metals. Polytetrafluoroethylene Dispersions. Evaluation of Paint Durability. The Painting of Magnesium Alloy Surfaces. E. M. Elliott, T. R. Bullett and W. F. Higgins. *Paint Manufacture,* v. 26, June 1956, p. 201-205.

Summaries of three papers on polytetrafluorethylene dispersions, accelerated weathering tests and painting of magnesium alloy surfaces. Role of coatings in protection against hard use, corrosion and weathering is emphasized. (L26)

521-L. Research and Development. Anti-Corrosive and Marine Paints. Plant and Equipment. *Paint Manufacture,* v. 26, June 1956, p. 215-218.

Cathodic protection, types of paints and primers. Pipelines, material handling, instrumentation, milling and mixing pumps. (L26, R10, A5)

522-L. Flame Plating Coating Process Grows as Production Method. *Western Metals,* v. 6, June 1956, p. 66-68.

Applications, advantages and procedures. (L23)

523-L. Plastisols Penetrate Pores of Western Metal Products. Donald B. Barber. *Western Metals,* v. 6, June 1956, p. 72-73.

Thick, single-coat dry films are produced with standard spraying equipment, and can be applied at room temperature to cold, vertical surfaces in thicknesses of 0.09-in. without sagging. (L26)

524-L. (German.) **Inhibiting Effect of Aluminum in Pot Galvanization on Formation of Iron-Zinc Alloy Layers.** Diedrich Horstmann. *Archiv für das Eisenhüttenwesen,* v. 27, no. 5, May 1956, p. 297-302.

Effect of temperature and aluminum content of the zinc smelt. Evaluation. (L16, Al, Fe, Zn)

525-L. (German.) **Modern Galvanic Deposition Processes.** E. Roth. *Metall,* v. 10, nos. 11-12, June 1956, p. 505-513.

Advantages and disadvantages of galvanic baths with a special consideration of corrosion. Improvement of processes. (L16, R1)

526-L. (German.) **Rust-Preventing Coatings. I.** K. A. van Oeteren-Panhäuser. *Metalloberfläche,* v. 10, no. 6, June 1956, p. 167-173.

General survey of rust prevention problems. Properties of coatings, mechanism of their action, need for multiple coats, methods of application. (L general)

527-L. (Russian.) **Some Questions Concerning the Theory of the Electrodeposition of Alloys. I. Metnods of Calculating the Potential Snift of Ionic Discharge Due to the Mixing Energy on Formation of the Alloy.** Yu. M. Polukarov and K. M. Gorbunova. *Zhurnal Fizicheskoi Khimii,* v. 30, no. 3, Mar. 1956, p. 515-521.

Shift may be calculated from thermochemical data or from data on free energy changes obtained from measurements in the vapor pressures of the components of the given system or from data on the electromotive force of the correspondingly constructed cell. (L17)

528-L. (Russian.) **Suppression of Structural Etching During Electrochemical Polishing.** S. I. Krichmar and V. P. Galushko. *Zhurnal Fizicheskoi Khimii,* v. 30, no. 3, Mar. 1956, p. 577-580 + 2 plates.

It was shown, with copper as example, that the electropolishing of a pure metal occurs with practically complete inhibition of etching, the surface graining only at comparatively low potentials. (L13, Cu)

529-L. Surface Preparation of Steel. II. Joseph Bigos. *Chemistry in Canada,* v. 8, June 1956, p. 66-70.

Solvent cleaning, steam cleaning, acid cleaning, chipping, wirebrushing, flame cleaning and sand blasting. (L10, L12, S1)

530-L. A Study of Whisker Formation in the Electrodeposition of Copper. P. A. Van Der Meulen and H. V. Lindstrom. *Electrochemical Society, Journal,* v. 103, July 1956, p. 390-395.

Possible mechanisms involved in electrolytic copper filament formation and its prevention, reasonable hypothesis to explain the process. (L17, M26, Cu)

531-L. Deposition of Titanium From Titanium-Oxygen Alloys on Copper, Iron, and Mild Steel. S. T. Shih, M. E. Straumanis and A. W. Schlechten. *Electrochemical Society, Journal,* v. 103, July 1956, p. 395-400.

Thick and corrosion resistance coatings on ingot iron, mild steels and other metals can be obtained by treating them under an inert gas in fused salt baths containing a titanium-oxygen alloy high in titanium content, and as large an

amount of such alloy as possible without sacrificing the fluidity of the bath. (L17, ST, Cu, Fe, Ti)

532-L. Research on the Surface Treatment of Die-Cast Zinc. II. On the Method of Electropolishing. Matsuhei Kishi. *Journal of Mechanical Laboratory (Japan),* v. 1, 1955, p. 31-32.

Electropolishing is useful as a preliminary treatment for electroplating of die-cast zinc, though not suitable for final surface treatment. (L13, E13, Zn)

533-L. Barrel Finishing in a Job Plating Plant. *Precision Metal Molding,* v. 14, July 1956, p. 54-57.

Chip and compound selection, barrel operation, influence of casting quality, application of barrel finishing. (L10, L17)

534-L. Ultracleaning With Ultrasonics. *Steel,* v. 139, July 9, 1956, p. 90-91.

Equipment and operation of automated, high-speed cleaning line with an integral ultrasonic chamber for scrubbing steering gear parts. (L10)

535-L. Electrodeposition of Titanium. W. Reid, A. Gaudette, A. Brenner and J. Connor. *U. S. Department of Commerce, National Bureau of Standards Report* 4148 and 4346. Progress Reports Apr. to June, and July to Sept. 1955, 8 p. and 6 p.

Preparation of new organotitanium compounds suitable for use in plating baths was attempted. These include primarily titanium alkyl derivates and carbonyl titanium compounds. No successful plating baths were obtained. (L17, Ti)

536-L. (Russian.) **Aluminum Diffusion Coating of Gas-Turbine Blades of Austenitic Steels.** V. I. Prosvirin, A. I. Fedosov and Iu. S. Miakishev. *Metallovedenie i Obrabotka Metallov,* 1956, no. 4, Apr. 1956, p. 50-56.

Methods for applying aluminum and aluminum-chromium diffusion coatings. Microhardness and erosion tests of coated and uncoated blades, and of blades with aluminum coating plus quenching and tempering. (L15, Q9, Q29, T25, AY, Al, Cr)

537-L. It's Cheaper by Tumbling. Leon E. Laux. *American Machinist,* v. 100, July 16, 1956, p. 124-128.

Cost per part tumbled fell from 10c to less than ¾c, as experience was gained and more diversified equipment installed. Use of precisely graded, fused aluminum-oxide chips and tumbling compounds is a major key to success. (L10)

538-L. Porcelain Enamel Applied Electrostatically. W. L. Smart. *Automation,* v. 3, Aug. 1956, p. 46-47.

Home appliance parts are sprayed with cover coat as they travel in helical paths around disks. (L27)

539-L. Red Lead in the Protection of Iron and Steel. I. H. Masseille. *Corrosion Prevention and Control,* v. 3, June 1956, p. 35-37.

Causes of metal oxidation, protection of metal surfaces, characteristics and properties of paints. (To be continued) (L26, ST)

540-L. Metallic Lead Pigment for Marine Anti-Corrosion Paints. I. J. R. Surridge, *Corrosion Prevention and Control,* v. 3, June 1956, p. 39-40.

Nature of the pigment and mechanism of protection; qualities of metallic lead paints as compared with practical requirements. (To be continued.) (L26, Pb)

541-L. Recent Research on Anticorrosive Bottom Compositions. H. J. Adams and J. C. Hudson. *Corrosion Prevention and Control,* v. 3, June 1956, p. 41-45.

Formulations of anticorrosive compositions; preparation of ship for painting; metallic coatings. (L26)

542-L. Metallising Non-Conductors. F. Elser. *Industrial Finishing (London),* v. 9, June 1956, p. 618-621. (Translated from *Metalloberfläche,* v. 8, no. 7, 1954, p. 107-110.)

Applications of the process and solutions used. (L23)

543-L. Productivity in the Electro-Plating Industry. G. A. Edwards and E. A. Ollard. *Industrial Finishing (London),* v. 9, June 1956, p. 631-633, 635.

A survey of representative plating shops giving detailed and general recommendations for improving output and reducing costs. (L17)

544-L. What You Should Know About Anodized Coatings for Aluminum. R. V. Vanden Berg. *Materials & Methods,* v. 44, July 1956, p. 90-94.

Types of treatments, properties, coloring and sealing and forming characteristics. (L19, Al)

545-L. Electroplated Coatings. J. B. Mohler. *Materials & Methods,* v. 44, July 1956, p. 117-132.

Data on characteristics and uses to help the designer of a metal product select an electroplated coating for decorative or functional purposes. (L17, T10)

546-L. Ball Burnishing Fundamentals. Arthur S. Kohler. *Metal Finishing,* v. 54, July 1956, p. 44-47.

Mechanical factors affecting the final finish, burnishing barrels, burnishing shot, barrel load and chemical factors affecting the final finish. (L10)

547-L. Surface Treatment and Finishing of Light Metals. IX. Coloring Anodic Coatings. S. Wernick and R. Pinner. *Metal Finishing,* v. 54, July 1956, p. 48-53.

Organic dyeing processes, inorganic dyes, multicolored effects and photographic and interference color processes. (L19, L14, EG-a)

548-L. Better Barrel Finishing With Improved Abrasives. William E. Brandt. *Metal Progress,* v. 70, July 1950, p. 88-90.

The new fused chips and bonded shapes of aluminum oxide and the chemical additives available make tumbling a precise method of cleaning and finishing the metal. (L10)

549-L. Blast Cleaning Variables. (Digest of "The Blast Cleaning of Metal Surfaces", by Otto Peltzer, *Stahl und Eisen,* v. 75, Dec. 1955, p. 1681-1691.) *Metal Progress,* v. 70, July 1956, p. 142, 144.

Previously abstracted from original. See item 213-L, 1956. (L10)

550-L. Leaf-Free Aluminum Pigments. I. New Grades Gain in Popularity. W. F. Torreyson Jr., and Kenneth E. Luyk. *Paint, Oil & Chemical Review,* v. 119, July 12, 1956, p. 8-10.

Applications and advantages of new metallic automotive finishes. (L26, H11, Al)

551-L. The Development of a Standard Blister Test for Automobile Paint Finishes. A. J. Birch. *Product Finishing,* v. 9, May, 1956, p. 65-75.

Correlation of existing test procedures; development of apparatus for mechanically agitated water soak test; specifications for preparation of test panels. (L26, S22)

552-L. Elementary Topics for Research in Metal Finishing. II. The Electroplating Process. C. James. *Product Finishing,* v. 9, May 1956, p. 76-89.

Purity of chemicals, anode problems, wash waters. (To be continued.) (L17)

553-L. Finishing Fluorescent Fixtures in Modernized Plant. *Products Finishing,* v. 20, July 1956, p. 16-22.

New plant uses the latest techniques in cleaning, phosphatizing, painting, baking and materials handling, integrated into a continuous "semiautomatic" procedure. (L26, L14, L10)

554-L. Surface Finishes for Stainless Steels. Kenneth M. Huston. *Products Finishing,* v. 20, July 1956, p. 24 + 10 pages.

Factors to be considered in finishing stainless steel. (L10, L12, SS)

555-L. Water Reducible Coatings for Industrial Finishing. Gerould Allyn. *Products Finishing,* v. 20, July 1956, p. 40-45.

Practical water-reducible primers for automotive and appliance use can be made with Rhoplex AC-33 acrylic emulsion. These finishes are substantially nonflammable in liquid form. (L26)

556-L. Producing Molds by Electroplating Methods. W. J. B. Stokes II. *Products Finishing,* v. 20, July 1956, p. 48-50.

The mold skin is electroformed in hard nickel and then backed with copper by electroplating until the dies are built up completely. (L18, Cu, Ni)

557-L. Recent Progress in Airless Spray Painting. James A. Bede. *Products Finishing,* v. 20, July 1956, p. 62-64.

Principles of airless spray, influence of nozzle selection and temperature on performance, applications. (L26)

558-L. More Jobs for Plating. *Steel,* v. 139, July 16, 1956, p. 136-138.

New processes such as level plating and brush plating lead to more industrial uses. (L17)

559-L. New Surfacing Techniques. K. H. Koopman and R. S. Zuchowski. *Welding Journal,* v. 35, July 1956, p. 665-671.

Mechanized oxy-acetylene hard surfacing, inert-arc processes, submerged-arc hard surfacing and composite-tube-rod surfacing. (L24)

560-L. (Czech.) **Diffusion Sulfurizing.** J. Nainar. *Strojirenska vyroba,* v. 4, no. 3, Mar. 1956, p. 123-124.

Types and methods of diffusion sulfurizing. Laboratory and industrial use tests. Effect of temperature on friction and wear properties of diffusion-sulfurized bearing surfaces. Need for further research. (L15, Q9)

561-L. (Czech.) **Use of Ultrasound in Cleaning Metal Surfaces.** J. Rones. *Strojirenska vyroba,* v. 4, no. 4, Apr. 1956, p. 162-163.

Ultrasound considerably accelerates degreasing of metal surfaces, particularly in organic solvents. Ultrasonic cleaning equipment. (L 10)

562-L. (French.) **Testing the Adherence Quality and Mechanical Brittleness of Vitrified Enamel Coatings Applied on Cast Iron and Sheet Steel.** Pierre Tyvaert. *Fonderie,* 1956, no. 124, May 1956, p. 185-197.

Use of pendulum-type and vertical drop-hammer and free-fall ball-bearing apparatus. (L27, ST, CI)

563-L. (French.) **Hot Galvanizing of Bolts and Small Pieces.** *Metallurgie,* v. 88, no. 5, May 1956, p. 501-505.

Inspection of finished pieces. Conclusions to series of articles on the subject. (L16, Zn)

564-L. (French.) **Surface Treatment of Aluminum and Its Alloys. III. Electrolytic Treatments—Anodic Oxidation.** Charles Etienne and Francois Flusin. *Revue de l'Aluminium,* v. 33, no. 232, May 1956, p. 507-513.

Anodic oxidation compared to electrolysis of water. (L19, Al)

565-E. (German.) **Electroplating of Palladium.** Edmund R. Thews. *Metalloberfläche,* v. 10, no. 7, July 1956, p. 193-196.

Plating methods, properties of coating, recovery of palladium. (L17, Pd)

566-L. (Norwegian.) **Macroscopic and Microscopic Plating Surface in the Electroplating Bath.** Einar Snekvik. *Teknisk Ukeblad,* v. 103, no. 25, June 21, 1956, p. 566-573.

Thickness and quality of plating and review of new plating methods. (L17)

567-L. **Chemical Kinetics in Porcelain Enamel Reactions.** Richard Moore Spriggs. *American Ceramic Society Bulletin,* v. 35, July 1956, p. 280-285.

In a study of the reactions of powdered iron and powdered cobalt with a frit containing copper ions, the amount of copper ion reduced to the metal was determined, using quantitative X-ray diffraction techniques, and the specific reaction rate k was calculated. Results showed that the specific reaction rate decreased rapidly as the time of reaction increased and as the per cent of powdered metal increased. An increase in temperature resulted in an increase in the reaction rate. (L27, P13, H11, Fe, Co)

568-L. **Aluminum Enameling. III. What Enamelers Should Know About Aluminum.** Paul A. Huppert. *Ceramic Industry,* v. 67, Aug. 1956, p. 73-75.

Properties, types of finishes and applications of enameled aluminum and its alloys. (L27, Al)

569-L. **The Commercial Advantages of Calcium Plumbate Paint.** *Corrosion Technology,* v. 3, July 1956, p. 233-235.

This powerful rust inhibitor has many other advantages such as good brushability and storage properties and great resistance to salt spray. (L26)

570-L. **The Painting of Castings.** E. Johnson. *Electroplating and Metal Finishing,* v. 9, July 1956, p. 225-228.

Priming and filling, comparative merits of wrinkle and hammer finishes and methods of producing them. (L26)

571-L. **Oxide Formation and Overvoltage of Oxygen on Lead and Silver Anodes in Alkaline Solution.** P. Jones, H. R. Thirsk and W. F. K. Wynne-Jones. *Faraday Society, Transactions.* v. 52, July 1956, p. 1003-1011.

Studies made in a solution of potassium hydroxide. (L19, P15, Pb, Ag)

572-L. **Pilot Setup for Experimental Flow Coating.** P. C. Bardin. *Industrial Finishing,* v. 32, July 1956, p. 48 + 5 pages.

The pilot installation, equipped with the latest automatic control devices, operates under actual shop conditions. (L26)

573-L. **Continuous Galvanizing.** *Instruments and Automation,* v. 29, July 1956, p. 1321.

Operation of a new continuous hot-dip galvanizing line. (L16, Zn)

574-L. **Finishing Aluminum.** R. C. Spooner and J. Loucks. *Modern Metals,* v. 12, July 1956, p. 62 + 4 pages.

Special emphasis is on extrusions. Mechanical finishes, anodizing procedures, color tests and a new German bright dip process. (L19, L10, L16, Al)

575-L. **Americium Electrodeposition.** Roy Ko. *Nucleonics,* v. 14, July 1956, p. 74.

The precipitation of metal hydroxides at the cathode by the electrolytic formation of base is applicable to the deposition of any element having a slightly soluble hydroxide, and provides a means for preparing thin, adherent films of the more electropositive elements that cannot be deposited as metals from aqueous solutions. In particular, this method is convenient for preparing thin films of the rare earth and actinide elements. (L17, Am)

576-L. **A Minimum Destruction Test for the Adhesion of Hard Chromium Deposits.** Hyman Chessin and John G. Poor. *Plating,* v. 43, July 1956, p. 913-915.

Observations of the small indenta-

tions made to a predetermined depth in hard chromium can determine whether the adhesion is or is not adequate. The method is applicable to production items where a small indentation may be tolerated. (L17, Cr)

577-L. Plating of Zinc Die Castings. K. W. Howard. *Plating,* v. 43, July 1956, p. 916-917.

A manually operated plant, for copper, nickel and chromium plating on zinc-base die castings. (L17, Zn, Cu, Ni, Cr)

578-L. Colored Anodic Coatings on Aluminum. Helmer Bengston. *Plating,* v. 43, July 1956, p. 918-921.

Factors which govern the formation of colored electrolytic oxide coatings on aluminum and its alloys. Properties of the oxide coating, and effect of alloying elements, coloring materials, and the finishing procedure. (L19, Al)

579-L. The CR-22 Anodic Coating for Magnesium. W. McNeill. *Product Finishing,* v. 9, June 1956, p. 48-51.

Anodically formed coating combines short treatment times and low electrolyte costs. Data are given on bath composition and control, preparatory treatment, a typical treatment cycle and performance. (L19, Mg)

580-L. Finishing Processes for Machine Tools. J. H. Ousbey. *Product Finishing,* v. 9, June 1956, p. 52-57, 98.

Factors determining choice of paints for machine tools, details of a complete cellulose finishing process. Applications for other types of finishes. (L26, ST)

581-L. Elementary Topics for Research in Metal Finishing. III. Electrodeposited Coatings. C. James. **Product Finishing,** v. 9, June 1956, p. 65-72.

Various problems concerning deposit distribution, alloy plating, deposit thickness and treatment after plating. (To be continued.) (L17)

582-L. Polyamide Resin-Epoxy Ester Combinations for Surface Coatings. *Product Finishing,* v. 9, June 1956, p. 76-78, 106.

Preparation of vehicle, application, qualities of the film produced. (L26)

583-L. Vinyl Laminate. C. F. Kiernan and A. J. Lombardi. *Product Engineering,* v. 27, July 1956, p. 167-170.

New adhesive and automatic bonding process "Marvibond" applies a 4 to 20-mil film of polyvinyl chloride to sheet metal; coating is tough and bonding tight enough to take forming and deep drawing without damage or separation from base metal. (L26)

584-L. Acid Etching and Electroforming Precision Parts. Marvin C. Cook. *Product Engineering,* v. 27, July 1956, p. 194-199.

Methods, applications, production techniques and design considerations. (L18)

585-L. Electrostatic Paint. The Ransburg Processes. Richard Tilney. *Sheet Metal Industries,* v. 33, no. 351, July 1956, p. 444-446, 454.

Principles of operation of the "Ransburg No. 2" process and recent developments related to its applicability. (L26)

586-L. Chromium Diffusion and Its Application to Sheet-Metal Parts. R. L. Samuel and N. A. Lockington. *Sheet Metal Industries,* v. 33, no. 351, July 1956, p. 447-454.

Defines position of diffusion processes within the vast range of surface treatments now available, and general physical properties of chromium-diffused parts. (L15, Cr, CN)

587-L. Hurry-Up Solution Control. *Steel,* v. 139, July 30, 1956, p. 94-95.

Conversion charts translate electrophotometer and automatic titrator readings directly into bath-addition quantities for standard enameling pickle-room solutions. (L12)

588-L. Processing With Supersonic Energy. Carl E. Meinheit. *Sylvania Technologist,* v. 9, July 1956, p. 89-94.

The use of ultrasonic energy in industrial applications offers advantages in cleaning, machining and fluxless soldering operations. Cavitation, the underlying force in sonic processing and some applications are described. (L10, G17, K7)

589-L. The Structure and Growth of Electrodeposits. H. Wilman. Paper from "The Journal of the Imperial College Chemical Engineering Society". p. 96-112.

Weight and thickness of electrodeposits as a function of current and time; microscopic observations; x-ray and electron diffraction studies. (L17, M27, M26)

590-L. (German.) **The Electrolytic Deposition of Rhodium.** J. Fischer and F. Leonhard. *Metall,* v. 10, no. 13-14, July 1956, p. 608-617.

Some problems of electroplating silver with rhodium, including conditions influencing the current yield, effect of inorganic and organic im-

purities in the bath on appearance of the deposit, protective properties of rhodium coatings and problems presented by the fissured structure of the thicker deposits.
(L17, Rh, Ag)

591-L. (German.) **Cladding of Materials With Precious Metals.** *Metall,* v. 10, no. 13-14, July 1956, p. 633-635.

Manufacture, properties and uses of bimetal electrical contact materials. (L22, T1, EG-c, SG-r)

592-L. (Czech.) **Zinc Coating of Wire and the Drawing of Zinc-Coated Wire.** Bedrich Hosna. *Hutnik,* v. 6, no. 3, Mar. 1956, p. 76-80.

Description and comparison of methods of zinc coating, including galvannealing, the "Crapo" method and galvanizing. Microstructure, drawability, and strength properties of wires zinc-coated by different methods.
(L16, F28, Q23, M27, ST, Zn)

593-L. (Russian.) **Some Questions Concerning the Electrodeposition of Alloys. II. Investigation of the Shift in the Ionic Discharge Potentials During Alloy Formation. III. Conditions for Nearing of Metal Deposition Potentials at the Expense of Alloying Energy.** Iu. M. Polukarov and K. M. Gorbunova. *Journal of Physical Chemistry,* v. 30, 1956, p. 871-881.

594-L. (Russian.) **Features of Anodic Behavior of Steel in an Electropolishing Electrolyte for Low Density Polarizing Currents.** G. S. Vozdvizhensky, A. Sh. Valeyev and G. A. Gorbachuk. *Doklady Akademii Nauk SSSR,* v. 108, no. 2, May 11, 1956, p. 299-301 + 1 plate.

Experiments toward explanation of the mechanism of electrolytic polishing, corrosion, passivation and general protection of metal. Steel samples showed a change in structure of the subsurface metal with no changes in the surface metal. Current density variations influenced composition. (L13, ST)

595-L. (French.) **Applications of Vacuum Techniques in the Deposition and Fusion of Materials.** R. P. Henry. *Métaux, Corrosion-Industries,* v. 31, no. 370, June 1956, p. 274-288.

General sketch of gas kinetics. Vacuum pumps. Methods of depositing thin layers of a material in a vacuum by thermal evaporation and cathodic atomization. Practical application of the latter method for depositing materials on semiconductors to make crystal rectifiers. (L25)

596-L. How Windshield Reveal Moldings Are Made, Buffed, and Plated. Herbert Chase. *Automotive Industries,* v. 115, July 15, 1956, p. 54-57, 180.

Illustrated step-by-step description. (L17, L10)

597-L. Electrocladding of Zirconium With Platinum. Arch B. Tripler, Jr., John G. Beach and Charles L. Faust. *Battelle Memorial Institute, (U. S. Atomic Energy Commission),* BMI-1097, June 1956, 11 p.

A method, which includes use of periodic reverse plating, was developed for electrocladding zirconium with sound, pore-free platinum coatings up to 1.5 mils in thickness. (L17, Zr, Pt)

598-L. Study of Bonding Fundamentals. Horace R. Ogden, James E. Reynolds, James B. Melehan and Robert I. Jaffee. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* BMI-1101, June 1956, 29 p.

Techniques and equipment developed for bonding and measuring bond strengths of single-asperity bonds. Preliminary results indicate that the growth of bonded areas may follow a rate equation. (L22)

599-L. Control of Contamination and Corrosion in Rail Tank Cars. S. John Oechsle, Jr. and Kenneth G. Le Fevre. *Flow,* v. 11, Aug. 1956, p. 94 + 7 pages.

Types of protective linings and coatings, preparation of tank car for lining application, application process. (L26)

600-L. Same Setup Tumble-Deburrs Large and Small Parts. J. E. Romais. *Iron Age,* v. 178, Aug. 2, 1956, p. 86-87.

Castings up to 30 in. long deburr in the same equipment handling 2-in. aluminum-clad parts. (L10, Al)

601-L. Continuous Hot Dipped Galvanizing. Nelson E. Cook and M. D. Ayers. *Iron and Steel Engineer,* v. 32, Apr. 1956, p. 53-57.

Regulates the degree of tightness of the zinc coating by controlling the amount of aluminum which unites with any iron that would normally tend to form alloy layers with the zinc on the surface of the steel being coated. (L16, Zn, ST)

602-L. The Alloying of Tin and Iron During Flow-Brightening of Electro-Tinplate. C. J. Thwaites. *Iron and Steel Institute, Journal,* v. 183, July 1956, p. 244-253.

Examination of the effect of varying time-temperature relationships on the rate of formation and on the metallography of the alloy layer. (L17, M27, Fe, Sn)

603-L. How a Non-Ferrous Job-Shop Cleans Castings. *Modern Castings.* v. 30, Aug. 1956, p. 54.

Cleaning is done by airless abrasive blasting in a 2-cu. ft. load unit. (L10, Cu, Al)

604-L. Leaf-Free Aluminum Pigments. II. Polychrome and Hammer Finish. W. F. Torreyson Jr., and Kenneth E. Luyk. *Paint, Oil & Chemical Review,* v. 119, July 26, 1956, p. 8-10.

Proper selection and combination of resins, solvents and color pigments is essential. (L26, Al)

605-L. A Study of Methods for Preparing Clad 24S-T3 Aluminum-Alloy Sheet Surfaces for Adhesive Bonding. I. Studies of Various Methods of Cleaning Clad 24S-T3 Aluminum-Alloy Sheets as Normally Received. II. Studies of Some of the More Promising Cleaning Methods in Treatment of Contaminated Surfaces of Clad 24S-T3 Aluminum-Alloy Sheets. H. W. Eickner and W. E. Schowalter. **III. Effect of Cleaning Method on Resistance of Bonded Joints to Salt-Water Spray.** H. W. Eickner. *U. S. Department of Agriculture, Forest Products Laboratory, Reports No.* 1813 and 1813-A, May 1950, Dec. 1950, 20 p. and 7 p.

(L12, K12, Al)

606-L. (French.) **Anticorrosive Plastic Coverings.** L. Rémy. *Corrosion et Anticorrosion,* v. 4, no. 5, June 1956, p. 217-221.

Shortcomings of bituminous coatings on buried metals. True protection against corrosion obtained by using several layers of material, each with a particular function. The layer in direct contact with the metal protects against chemical and electrical action. (L26)

607-L. (German.) **Plastic Coating of Metals.** G. Schulz. *Schweizer Archiv für Angewandte Wissenschaft und Technik,* v. 22, no. 6, June 1956, p. 178-182.

Application of plastics as powder, paste, foil or plate. (L26)

608-L. (German.) **Flame Sprayed Nonmetallic Coating.** Hans Reininger. *Werkstoffe und Korrosion,* v. 7, no. 7, July 1956, p. 373-385.

Equipment and material for protective spray coating of metals. Properties. (L26)

609-L. (English.) **The Electrode Process in Metal Deposition From Aqueous Solutions.** Einar Mattsson. *Acta Polytechnica (Chemistry Including Metallurgy Series),* v. 6, no. 12, 1955, 56 p.

On electrodeposition, the cathode potential decreases below its equilibrium value. This is called polarization and is dependent on current density, temperature, time, the nature of the metal, and the composition of the solution. (L17)

610-L. A Survey of Literature on Hot Dip Galvanizing, 1950-1955. J. J. Sebisty. *Canada, Department of Mines and Technical Surveys, Mines Branch Research Report No.* PM202, Apr 1956, 60 p.

Composition and surface condition of the steel and the composition of the bath. (L16, ST, Zn)

611-L. Vacuum Metallizing: The Big Boom Is On. *CEC Recordings,* v. 10, July-Aug. 1956, p. 6-7.

Vacuum coating is providing better-looking products at extremely low costs. (L25)

612-L. Corrosion Control Practices for Pipe-Type Cables on the Detroit Edison System. W. A. Sinclair. *Corrosion,* v. 12, Aug. 1956, p. 385-388.

Pipes are covered with ½-in. thick coating of somastic, buried, and tested with 500-volt megger. A ground surface survey is made when irregularities are detected. (L26)

613-L. Mechanism of Surface Impregnation of Iron and Steel With Boron. G. V. Samsonov and N. Ya. Tseitina. *Henry Brutcher, Translation No.* 3745, 7 p. (From *Fizika Metallov i Metallovedenie,* v. 1, no. 2, 1955, p. 303-306.) Henry Brutcher, Altadena, Calif.

Micrographic and X-ray studies of boron diffusion into Armco iron and steel. (L15, N1, M22, ST, B)

614-L. Phosphating of Wire and Wire Rod Preparatory to Cold Drawing and Its Importance for the Wire Industry. L. Kus. *Henry Brutcher, Translation No.* 3717, 8 p. (Abridged from *Hutnik, (Poland),* v. 22, no. 9, 1955, p. 318-324.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 376-L, 1956. (L14, F28)

615-L. Mechanism of Wash Primer Action. Jerome Kruger and M. C. Bloom. *Industrial and Engineering Chemistry,* v. 48, Aug. 1956, p. 1354-1360.

An investigation of the structure of wash primer film on an iron surface, its mechanism of formation, and its mode of action in retarding corrosion and increasing paint adhesion. (L26, Fe)

616-L. The Use of Gas in Vitreous Enamelling. *Industrial Finishing,* v. 9, July 1956, p. 676-680, 682-683.

Enamel frit production, cast-iron process, base coat application and treatment, metal preparation, enamel cover coat application and treatment, tests and inspection of vitreous enamel finishes. (L27, CI)

617-L. The Quality of Electro-Deposits. *Industrial Finishing,* v. 9, July 1956, p. 686, 688-689.

Pilot production lines, development of tests for control of bath, thickness test, chromium deposits. (L17, Ni, Cr)

618-L. Of Nickel Atoms, Ions and Electrons. W. A. Wesley. *Institute of Metal Finishing, Bulletin,* v. 6, Summer 1956, p. 87-106.

Nickel electrode reactions and the thermodynamic limitations within which their mechanisms must operate. (L17, P12, Ni)

619-L. Some Experimental and Practical Aspects of Heavy Rhodium Plating. F. H. Reid. *Institute of Metal Finishing, Bulletin,* v. 6, Summer 1956, p. 107-142.

Preparation of electrolyte, influence of composition and deposition factors on internal stress of deposits, factors affecting incidence of cracking. (L17, Rh)

620-L. Zinc-Rich Paint: A Coating for Problem Surfaces. D. E. Wilbur. *Iron Age,* v. 178, Aug. 9, 1956, p. 82-84.

Zinc-rich paints adhere even to corroded surfaces, also find use as welding primers. (L26, Zn)

621-L. Surface Treatment and Finishing of Light Metals. X. Sealing Anodic Oxide Coatings. S. Wernick and R. Pinner. *Metal Finishing,* v. 54, Aug. 1956, p. 53-58.

The chief sealing techniques consist of immersion in boiling water, solutions of dichromates or chromates, silicates, or metal salts which hydrolize in the coating to form hydroxides, such as nickel and cobalt salts, or in solutions of organic capillary active compounds. (L19, EG-a)

622-L. Covering Power in Chromium Plating Baths. Robert H. Rousselot. *Metal Finishing,* v. 54, Aug. 1956, p. 60-65.

Influence of the five independent variables with particular reference to the interdependence of temperature and mean current density. (L17, Cr)

623-L. Finishing Supplement: Bright Nickel Plating. E. Lütter. *Metal Industry,* v. 89, July 27, 1956, p. 65-67.

Some of the methods used to obtain sound, adherent, and bright deposits from various solutions. Results of tests made to ascertain the protective value of the coating. (L17, Ni)

624-L. Chromizing of Steel. E. Gasior. *Henry Brutcher, Translation No.* 3708, 13 p. (Condensed from *Prace Imh,* v. 7, 1955, p. 1-10.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 329-L, 1955. (L15, Cr, ST)

625-L. The Development of Nickel and Chromium Plating Since 1945. E. A. Ollard. *Product Finishing,* v. 9, July 1956, p. 116-128.

Chief advances were made in the use of organic bright nickel baths and improvements in methods of handling work. (L17, Ni, Cr)

626-L. The Future of Electroplating Solution Control. K. E. Langford. *Product Finishing,* v. 9, July 1956, p. 129-134.

Present analytical methods are evaluated and suggestions made for planning of future developments. (L17)

627-L. Development in Tin and Tin Alloy Plating 1946-1956. J. W. Price. *Product Finishing,* v. 9, July 1956, p. 135-142.

Acid and alkaline solutions; codeposition of tin with lead, copper, zinc, nickel and cadmium. (L17, Sn)

628-L. Ten Years of Research and Development in Anodising. A. W. Brace. *Product Finishing,* v. 9, July 1956, p. 143-153.

New materials, anodizing processes, bright anodizing, architectural applications of anodized aluminum, an automatic anodizing plant, continuous methods. (L19, T26, Al)

629-L. Non-Mechanical Methods of Metal Brightening. I. Stainless Steel. H. Silman. *Product Finishing,* v. 9, July 1956, p. 168-171.

Chemical and electrolytic polishing processes; stainless steel applications. (To be continued.) (L12, L13, SS)

630-L. Hot Dip Galvanizing 1946-1956. I. M. L. Hughes. *Product Finishing,* v. 9, July 1956, p. 181-193.

Review of technical literature, preparatory treatment, handling and heating methods, bath temperature and composition, formation of residuals and zinc recovery. (To be continued.) (L16, Zn)

631-L. The Decade's Developments in Vitreous Enamelling. J. C. Oliver. *Product Finishing,* v. 9, July 1956, p. 172-180.

New production methods, new base metals, thinner coating developments, low-firing enamels, chemical resistance, ceramic coatings and color improvements. (L27)

632-L. The Value of Rinse Control in Phospnate Coating Processes. Richard B. Stribley. *Product Finishing,* v. 20, Aug. 1956, p. 42-44, 46-47.

Water and chromic acid rinses and their effect on costs and quality. (L14)

633-L. Continuous Strip Gets Tight Coat. *Steel,* v. 139, Aug. 6, 1956, p. 118, 121.

Equipment and operation of continuous hot-dip galvanizing line. (L16, Zn, ST)

634-L. Copper Anodes for Electroplating. H. Bovet. *Henry Brutcher, Translation No.* 3738, 8 p. (From *Pro-Metal,* v. 7, no. 43, 1955, p. 452-456.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 280-L, 1955. (L17, Cu)

635-L. Chromium Plating of Cutting Tools. M. E. Gol'dshtein and V. M. Fridenson. *Henry Brutcher, Translation No.* 3720, 7 p. (From *Stanki i Instrument,* v. 26, no. 7, 1955, p. 26-28.) Henry Brutcher, Altadena, Calif.

Complete procedure for the controlled chromium plating of various tools to a thickness of 2-3 microns. (L17, Q9, Cr, TS)

636-L. Properties of Flame-Sprayed Zinc Coatings. E. Gebhardt and H. D. Seghezzi. *Henry Brutcher, Translation No.* 3751, 12 p. (Abridged from *VDI Zeitschrift,* v. 98, no. 2, 1956, p. 41-45.) Henry Brutcher, Altadena, Calif.

Particulars on spray control with wire and powdered zinc; physical and mechanical properties. (L23, P15, Q general, Zn)

637-L. Sulfidizing of Gray Iron and Steel. I. M. Engalychev and P. U. Zemskov. *Henry Brutcher, Translation No.* 3744, 6 p. (From *Vestnik Mashinostroeniya,* v. 36, no. 2, 1956, p. 46-48.) Henry Brutcher, Altadena, Calif.

Composition of sulfidizing solutions, applications of sulfidized metals. (L14, CI, ST)

638-L. Residual Stresses in Electrodeposits. A. T. Vagramyan and Yu. S. Tsareva. *Henry Brutcher, Translation No.* 3749, 13 p. (From *Zhurnal Fizicheskoi Khimii,* v. 29, no. 1, 1955, p. 185-193.) Henry Brutcher, Altadena, Calif.

Critical review of theories of residual stresses in electrodeposits. Phenomenon studied by the automatically recorded cathode flexure method. (L17, Q25)

639-L. (Russian.) Nature of Surface Zones Arising During Diffusion of Chromium Into Iron. G. N. Dubinin. *Zhurnal Tekhnischeskoi Fiziki,* v. 26, no. 6, June 1956, p. 1345-1350 + 2 plates.

Microstructure and microhardness of iron after gas chromation at 1200° C.; differences by zones, including peculiarities of separation zone. Effect of different cooling rates. (L15, M27, Q29, Fe, Cr)

640-L. Rubber-Bonded Abrasives Give New Bounce to Finishing. *Iron Age,* v. 178, Aug. 30, 1956, p. 92-94.

Available in four grits and a variety of sizes and shapes, rubberized abrasives help solve many special finishing problems. Abrasive-rubber blend cuts or polishes without digging in, tearing or drawing even the softest metals. It's unaffected by water or coolants and there's no time lost reloading wheels with fresh abrasive. (L10, G18)

641-L. Aluminizing Progress. H. E. Erstrom. *Light Metal Age,* v. 14, Aug. 1956, p. 24-27.

When designers, engineers, architects and others whose problems are to prevent corrosion of steel members, are fully acquainted with "Mollerizing", they will find that this method of coating steel is an answer to a great number of their problems. (L16, Al)

642-L. Some Tips on the Use of Protective Coatings for Springs. *Mainspring,* v. 16, Aug. 1956, 5 p.

Surface preparation, types of finishes, salt spray resistance. (L general)

643-L. Ball Burnishing. Arthur S. Kohler. *Metal Industry,* v. 89, Aug. 10, 1956, p. 107-109.

Process conditions when burnishing with steel balls. (L10, ST)

644-L. Use of Beryllium Oxide for the Beryllium Impregnation of Steel. V. A. Parfenov. *Henry Brutcher Translation No.* 3737, 4 p. (From *Metallovedenie i Obrabotka Metallov,* v. 2, no. 3, 1956, p. 17-19.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 460-L, 1956. (L15, Q9, M26, Be, ST)

645-L. (Czech.) Diffusion Sulfide Process for Piston Rings. Otakar Moravek. *Slévarenstvi,* v. 4, no. 7, July 1956, p. 209-213.

Advantages and possible use as a new process of chemical heat treatment not only for piston rings but also for other mechanical parts. (L15, CI)

646-L. (Czech.) **Comments on Stresses in Hard Facing.** Vaclav Linhart and Karel Lobl. *Zvaranie,* v. 5, no. 6, June 1956, p. 163-166.

Effects of austenitic chromium-nickel layers on the distribution and degree of stresses in the coating. Effects of various heat treatments on the stresses. (L24, Q25, J general, AY)

647-L. (Czech.) **New Processes in Manufacturing Hard Facing Electrodes.** Jaroslav Vidrma. *Zvaranie,* v. 5, no. 6, June 1956, p. 174-178.

Advantages and savings resulting from use of electrodes in which some of the alloy required is incorporated in the coating. Considerations of composition and thickness of the coating. (L24, T5)

648-L. (French.) **Progress in Electrolytic Polishing. Its Application to the Study of the Physical Properties of Materials.** I. Epelboin. *Corrosion et Anticorrosion,* v. 4, no. 5, May 1956, p. 166-171.

Anions, perchlorate baths and other electrolytic or chemical methods have been used successfully. This method can be applied to many metals. (L13)

649-L. (French.) **Industrial Electrolytic Zinc Coating of Steel Sheet; Principal Advantages and Field of Application.** G. Pieltain, J. Deheneffe and P. Lemal. *Corrosion et Anticorrosion,* v. 14, no. 7, July-Aug. 1956, p. 233-240.

Preparation, phosphating and chromating of steel sheet, description of tests, results of analysis and study of coating, improvement obtained and wide field of practical application. (L17, Zn, ST)

650-L. (French.) **Vitrified Enamels on Light Metals.** F. J. Biechler and J. J. Meynis de Paulin. *Corrosion et Anticorrosion,* v. 14, no. 7, July-Aug. 1956, p. 241-245.

Enamels containing lead oxide, alkali, lithium oxide, and silica show good results. They are fired at 530 to 540° C. (L27, Mg, Al)

651-L. (French.) **Phosphating in Solvent Phase.** J. Baudin. *Corrosion et Anticorrosion,* v. 14, no. 7, July-Aug. 1956, p. 252-258.

Easy method of phosphating in solvents such as ketones, alcohols and aldehydes. This method yields good results. (L14)

652-L. (German.) **Sprayed-On Aluminium Coatings.** H. Reininger. *Aluminium,* v. 32, no. 8, Aug. 1956, p. 480-485.

Historical review, summary of literature on practical experience, including effects of normal weathering, industrial atmospheres, ordinary and sea water, sea air and fuels. (L23, R3, R4, R7, Al)

653-L. (German.) **Effect of Iron Inclusions on Zinc Attack.** D. Horstmann. *Metall,* v. 10, no. 15-16, Aug. 1956, p. 701-708.

Determination of iron losses in the galvanization process, value of the zinc attack, effect of carbon, silicon, manganese, phosphorus, sulfur, aluminum and copper contents. (L16, M27, Zn, Fe)

654-L. (Italian.) **Researches on the Chromium Content of the "Aluminum Blacks". Use of Radioactive Chromic Acid.** L. Guerreschi and R. Romita. *Alluminio,* v. 25, no. 7-8, July-Aug. 1956, p. 333-336.

Shows that the chromium content of the "aluminum blacks", formed under the same electrochemical conditions is practically constant. (L21, S11, Cr, Al)

655-L. (Swedish.) **What Are the Possibilities by Means of Polarization Measurements of Performing Improved and More Efficient Pickling Processes in the Steel Industry.** K. H. Brakstad. *Jernkontorets Annaler,* v. 140, no. 7, 1956, p. 512-519.

Industrial pickling discussed on basis of laboratory polarization measurements. (L12, ST)

656-L. Flame Spraying of Metals and Plastics. G. R. Lawrance. *Corrosion Technology,* v. 3, Aug. 1956, p. 254-257.

Equipment, materials and methods of spray coating metals. (L23, Fe, Pb, Zn, Al, Sn)

657-L. Vacuum Metallizers Reach New Markets. P. J. Clough and J. H. Durant. *Iron Age,* v. 178, Sept. 6, 1956, p. 91-94.

With precisely controlled film thickness, the low-cost coating adheres well to metals and nonmetals alike. Formerly considered decorative, it is now valuable as a specialty coating. (L25, ST, Cu, Cr)

658-L. Silicone Protective Coatings in Metal Finishing. P. A. J. Gate. *Product Finishing,* v. 9, Aug. 1956, p. 48-51.

Silicone resin-based finishes offer a number of advantages, particularly where a combination of heat and weather resistance is required. Recent developments in this field are

reviewed, along with details of several typical applications. (L26)

659-L. Non-Mechanical Methods of Metal Brightening. II. Aluminium. H. Silman. *Product Finishing,* v. 9, Aug. 1956, p. 52-60.

Use of chemical and electrolytic polishing methods for brightening aluminum. (L12, L13, Al)

660-L. Hot Dip Galvanizing 1946-1956. II. M. L. Hughes. *Product Finishing,* v. 9, Aug. 1956, p. 61-67.

Literature survey, covering galvanizing of sheet strip, wire and tube. (L16)

661-L. Elementary Topics for Research in Metal Finishing. IV. C. James. *Product Finishing,* v. 9, Aug. 1956, p. 75-85, 116.

Deals with preparatory cleaning, spraying, hot dipping, vacuum deposition and plastic coating. (L general)

662-L. (French.) **Steel Corrosion Prevention by Metallic Coating and Especially by Hot Galvanizing.** J. F. H. van Eijnsbergen. *Centre Belge d'Etude det la Corrosion, Rapport Technique,* no. 36, July 1956, p. 3-7; disc., p. 7-8.

Zinc, aluminum or cadmium coatings, methods used and influence of zinc thickness on capacity to withstand corrosion. (L16, ST, Zn, Al, Cd)

663-L. (German.) **The Effect of Ultrasonics on Electrodeposition of Metals.** A. Roll. *Metalloberfläche,* v. 10, no. 8, Aug. 1956, p. 230-233.

Qualitative and partly quantitative determination of the effects of ultrasonics at various frequencies on electroplating with nickel, silver and chromium. (L17, Ni, Ag, Cr)

664-L. (German.) **Cleaning With Ultrasonics by Using Magnetostriction Oscillators.** H. J. Collmick and K. Tesser. *Metalloberfläche,* v. 10, no. 8, Aug. 1956, p. 233-237.

Ultrasonics with frequencies between 20 and 30 kc., emitted by sheets of nickel with effective oscillation surfaces varying from 70 sq.-cm. to several hundred sq.cm., as the most effective and easily applicable cleaning method in industry. (L10)

665-L. (Russian.) **Effect of Carbon on Resistance of Weld-Deposited Metal to Abrasive Wear.** E. I. Leinachuk. *Avtomaticheskaia Svarka,* v. 9, no. 3, May-June 1956, p. 58-64.

Effect of carbon on hardness and resistance to wear of hard facing containing 0.17 to 2.54% carbon. (L24, Q9, CN)

666-L. Thermal Expansion of Commercial Dry Process Enamels and Cast Irons. R. R. Danielson and D. V. Van Gordon. *American Ceramic Society Bulletin,* v. 35, Sept. 1956, p. 347-350.

Coefficients of thermal expansion were determined with a quartz-rod type of dilatometer. Effect of firing treatment during enameling on chemical and physical state of carbon and thermal expansion of irons. Relation of thermal expansion of enamels and irons on crazing and chipping. (L27, P10, CI)

667-L. Role of Nickel Dip in Enamelling of Sheet Steel. D. G. Moore, J. W. Pitts and W. N. Harrison. *Industrial Finishing, (London),* v. 9, Aug. 1956, p. 36-38, 40-41.

Effects of nickel dip on development of adherence and fish-scaling tendencies by a cobalt-free and a cobalt-bearing ground-coat enamel on both enameling iron and a titanium-bearing low carbon steel. (L27, Ni, CN)

668-L. Less Common Metals and Alloys. Electrodeposition From Aqueous Solution. M. L. Holt. *Metal Finishing,* v. 54, Sept. 1956, p. 48-55.

Summary and evaluation of available information dealing with electrodeposition of metals of groups IVb, Vb, VIb, and VIIb. (L17)

669-L. Surface Treatment and Finishing of Light Metals. XI. Properties of Anodic Coatings. S. Wernick and R. Pinner. *Metal Finishing,* v. 54, Sept. 1956, p. 56-60, 64.

Physical and chemical properties, testing methods. (To be continued.) (L19, S14, EG-a)

670-L. Varnishing Light Metals. J. J. Meynis De Paulin. *Metal Industry,* v. 89, Aug. 24, 1956, p. 143-146.

Behavior of numerous varnishes studied under various conditions. (L26, EG-a)

671-L. The Pretreatment of Metal Surfaces. Maxwell Lewis. *Sheet Metal Industries,* v. 33, no. 353, Sept. 1956, p. 639-646.

Purposes of metal preparation, cleaning procedures, phosphating processes, anodizing treatments. (L10, L14, L19, Al)

672-L. Longer Service Life Through Hard Surfacing for Petroleum Industry Equipment. H. S. Gonser. *Welding Journal,* v. 35, Sept. 1956, p. 890-894.

Hard-surface coatings have demonstrated their ability to resist the effects of the severe abrasive and corrosive conditions so frequently

encountered in oil industry usage. Typical applications. (L24)

673-L. Colored Chromium Plates. N. T. Drobantseva. *Henry Brutcher Translation No.* 3798, 4 p. (From *Vestnik Mashinostroeniya,* v. 36, no. 5, 1955, p. 68.) Henry Brutcher, Altadena, Calif.

Deep-black and golden-brown electroplates on various metals from chromic anhydride solutions. Bath composition, temperature and plating time for black plates on steel, copper and copper alloys. (L17, Cr)

674-L. (German.) **Metallic Blast-Cleaning Shot and Its Testing.** Erich Bickel. *Stahl und Eisen,* v. 76, no. 17, Aug. 23, 1956, p. 1116-1128.

Types and qualities of shot, testing methods and testing machines, methods of interpreting the results of wear tests, economic considerations. (L10, Q9)

675-L. (Russian.) **Anticorrosion Treatment of Zinc Coatings.** N. A. Slolv'ev. *Zhurnal Prikladnoi Khimii,* v. 29, no. 7, July 1956, p. 1062-1066.

Treatment of zinc-coated surfaces in a solution of chromic, sulphuric and hydrochloric acids. (L14, L16, Zn)

676-L. (Spanish.) **A New Treatment of Iron Equipment Which Should Resist Wear by Friction.** Eduardo Gonzalez Jolin. *Instituto del Hierro y del Acero,* v. 9, no. 48, July 1956, p. 795-801.

"Sulphidization" is a process consisting of heating for ½ to 3 hr. in a salt bath of suitable composition at about 560° C. After this treatment iron specimens rub together without lubricant without binding. Practical applications. (L15, Q9, ST)

677-L. The Anodic Oxidation of Copper-Tin (Speculum) Alloys at Very Low Current Density. S. E. S. El Wakkad, T. M. Salem, A. M. Shams Eldin and Z. Hanafi. *Chemical Society, Journal,* Aug. 1956, p. 2857-2861.

Stannous hydroxide is first formed over the surface of the speculum anode, followed by stannic hydroxide, cuprous oxide and cupric hydroxide successively before evolution of oxygen. (L19, Cu, Sn)

678-L. The Anodic Behaviour of Lead in Halide Solutions. G. W. D. Briggs and W. F. K. Wynne-Jones. *Chemical Society, Journal,* Aug. 1956, p. 2966-2971 + 2 plates.

Anodic polarization of freshly cut lead surfaces at constant current density in a variety of halide solutions. Study of the crystalline salt layers by optical microscopy. (L19, Pb)

679-L. Electrochemical Studies of Paint Films on Metals. D. M. Brasher. *Electroplating and Metal Finishing,* v. 9, Sept. 1956, p. 280-284.

Investigation shows the value of the resistance capacitance technique in evaluating the performance of different paints and in assessing the influence of changes in pigment or medium formulation upon water uptake and the life of the paint. (L26)

680-L. Anodic Oxidation of a Copper (110) Face in Alkaline Solutions. A. Goswami. *Journal of Scientific & Industrial Research,* v. 15, sec. B, July 1956, p. 340-345 + 1 plate.

A study of anodic reaction products, their nature and the mode of crystal growth in caustic soda solution at 75-80° C. (L19, N12, Cu)

681-L. New Protective Lacquer for Aluminum. Robert J. Fabian. *Materials & Methods,* v. 44, Sept. 1956, p. 104-105.

A single spray coat of low-viscosity cellulose acetate butyrate prevents dulling, staining and pitting in outdoor applications. (L26, Al)

682-L. Sulfurizing—New Surface Treatment—Reduces Scoring and Seizing. George B. Troup. *Materials & Methods,* v. 44, Sept. 1956, p. 110-113.

New salt-bath process increases life of iron and steel parts that must operate under boundary lubrication conditions. (L15, ST, Fe)

683-L. Pitting of Electrodeposits. J. M. Odekerken. *Metal Industry,* v. 89, Sept. 7, 1956, p. 187-188.

Pores and pitting can be attributed to base material, chemical pretreatment and plating solution. Preventive measures. (L17)

684-L. Variables Affecting Coating Performance. John I. Richardson. *Organic Finishing,* v. 17, Sept. 1956, p. 20-21.

Causes of variation in the protective value among individual coatings of the same type. (To be continued.) (L26)

685-L. Plating on Unusual Metals. Charles L. Faust and John G. Beach. *Plating,* v. 43, Sept. 1956, p. 1134-1142.

Sound products can be provided by electrocladding when the tendency for the plate and basis metal to alloy by diffusion exists and when the strength and properties of the diffusion alloy are known to be satisfactory for the intended service. (L17)

686-L. High-Temperature Adherence of Nickel Plates to Molybdenum. S. S. Brenner. *Plating,* v. 43, Sept. 1956, p. 1143-1144.

Significance of noncontinuous copper flash coating in this process. (L17, Ni, Cu, Mo)

687-L. (French.) **The Influence of Five Independent Variables on the Coating Capacity of Chromium Plating Baths, and Especially the Interdependence of Temperature and Average Current Density.** Robert H. Rousselot. Paper from "Chrome Dur". p. 6-16.

Effect of temperature, current and bath concentration on rate of deposition. (L17, Cr)

688-L. (French.) **Preparation of Surfaces by Damp Sanding Application to Hard Chromium Plating.** G. Icxi. Paper from "Chrome Dur". p. 17-24.

Comparison of damp sanding with the old process of dry sanding. Methods and apparatus used; advantages. (L10, L17, Cr)

689-L. (German.) **Are Lead Colors Becoming Superfluous in Rust Prevention?** Hans Hebberling. *Werkstoffe und Korrosion,* v. 7, no. 8-9, Sept. 1956, p. 433-435.

Recent investigations of the electrochemical properties of red lead are proving its protective value effective, especially for the German Federal Railways. (L26)

690-L. (Russian.) **Electropolishing of Consumer Goods.** V. G. Shabunin. *Vestnik Mashinostroeniia,* v. 36, no. 8, Aug. 1956, p. 60-62.

Electropolishing of tubing and other parts for beds. Discusses electrolytes, voltages, currents, auxiliary equipment and procedures. (L13)

691-L. (Russian.) **Effect of Solution Acidity on Cathodic Polarization During the Electrodeposition of Cobalt and Nickel.** Z. A. Solov'eva and O. A. Abrarov. *Zhurnal Fizicheskoi Khimii,* v. 30, no. 7, July 1956, p. 1572-1578.

On raising the pH at a definite narrow interval an abrupt fall in the polarization takes place. With increase in temperature this interval shifts to higher acidity values. It changes with change in the nature of the anion. (L17, Ni, Co)

692-L. Finishing Systems for Aluminum. R. V. Vanden Berg. *Electrical Manufacturing,* v. 58, Oct. 1956, p. 150-155, 292, 295.

Surface finishes produced by mechanical, chemical and electrochemical methods, besides painting and porcelain enameling. (L general, Al)

693-L. Metal Cladding. George Durst. *Metal Industry,* v. 89, Sept. 14, 1956, p. 203-204.

Results of the cladding step in a green bonded clad metal. The heat treatment or sintering operation will transform the green bond into a substantially continuous, strong bond. (L22)

694-L. Precision Wet Barrel Finishing. J. E. Romais. *Metal Industry,* v. 89, Sept. 21, 1956, p. 227-228.

Wet tumbling process as applied to small parts in an aircraft machine shop. (L10)

695-L. Hard Chromium Plating of Press Tools. J. W. Oswald. *Sheet Metal Industries,* v. 33, no. 354, Oct. 1956, p. 691-694; disc., p. 694-697.

Properties of chromium and of toolsteel, thickness of deposit, effect of heat treatment, comparative service life data for plated and unplated tools. (L17, TS, Cr)

696-L. Preparation of Protective Coatings by Electrophoretic Methods. A. C. Werner, B. Triffleman, D. Rothacker and N. Ross. *Vitro Laboratories, (U. S. Atomic Energy Commission),* KLX-10028, Jan.-Mar. 1956, 23 p.

Preparation and oxidation testing of 80-20 nickel-chromium and nickel-bonded Cr_3C_2 coatings. Impact erosion, thermal shock tests. (L general, Ni)

697-L. (German.) **Basic Requirements for Rust Prevention.** A. V. Blom. *Chimia (Switzerland),* v. 10, no. 9, Sept. 1956, p. 208-214.

Means of combatting corrosion in iron with a special consideration of protective coating techniques. (L26, Fe)

698-L. (Book.) **The Electrolytic and Chemical Polishing of Metals in Research and Industry.** W. J. McG. Tegart. 129 p. 1956. Pergamon Press Ltd., 4 & 5 Fitzroy Square, London, W.1., England.

Industrial and laboratory methods for specific metals and their alloys. Mechanism and characteristics of the polishing process. Apparatus, precautions required, and applications. (L12, L13)

699-L. (Book.) **Our Plating Industry. 1955-1956 Directory.** 309 p. 1955. Almond Publishing Co., 815 15th St. N.W., Washington 5, D. C.

A buyers' guide to suppliers, manufacturers, platers and metal finishers, advertising agencies, business consultants and trade schools in the plating industry, arranged alphabetically by state and city. (L17, A10)

700-L. (Book—French.) **Hard Chromium.** 43 p. 1956. Publication Annuelle du Centre d'Information du Chrome Dur, Grand Palais, Porte C, Paris, 8, France.

This 1956 issue contains five papers delivered at the yearly Hard Chromium Convention in May, 1955. Papers are separately abstracted. (L17, Cr)

701-L. Influence of Copper Ions on Adherence of Vitreous Coatings to Stainless Steel. D. G. Moore and A. G. Eubanks. *American Ceramic Society, Journal,* v. 39, Oct. 1956, p. 357-361.

Copper ions produced significant increase in adherence on both pickled and sandblasted surfaces. Effect of the copper decreased with increased firing temperature and increased firing time for pickled specimens. (L27, Cu, SS)

702-L. Selection of Hard Facing Materials for Lowest Maintenance Cost. N. D. Berrick. *Australasian Engineer,* v. 48, Aug. 1956, p. 47-53.

Structure and properties of materials, types of hard facing rods and electrodes, service performance of hard faced parts. (L24)

703-L. Chromium Plating. D. J. Fishlock. *Chemistry and Industry,* no. 37, Sept. 22, 1956, p. 977-980.

Review of electroplating procedures, methods for producing surface finishes with desired physical and chemical characteristics, factors influencing bright plating. (L17, Cr)

704-L. Permeation of Gases Through Nickel Deposits. I. Determination of the Intrinsic Permeability of Nickel Deposits to Gases. D. T. Ewing, J. Martin Tobin and D. Gardner Foulke. *Electrochemical Society, Journal,* v. 103, Oct. 1956, p. 545-548.

Values were obtained for permeability constants of nickel electrodeposits to hydrogen and helium with a good degree of reproducibility. Pores present in sound nickel electrodeposits were extremely small. (L17, Ni)

705-L. New Design of an Electrolytic Cell for the Study of Electroplating Phenomena. Roger Gilmont and Robert F. Walton. *Electrochemical Society, Journal,* v. 103, Oct. 1956, p. 549-552.

Geometrical shape of a new electroplating cell was deduced in which the current density along the cathode is linear and can be calculated directly from the total current and voltage of the cell. (L17)

706-L. Electron Microscope Studies of Copper Anodes Obtained in Sulfate and Cyanide Baths. Shinzo Okada, Saburo Magari and Kentaro Katsui. *Electrochemical Society, Journal,* v. 103, Oct. 1956, p. 553-557.

Studies revealed that appearance of the microstructure of the surface formed during electrolysis varied with the electrolytes, but the same crystal planes were developed in both baths and in a number of etching solutions. (L17, M27, Cu)

707-L. Electron Microscope Studies on Copper Electrodes in Sulfate Bath Containing Addition Agent. Shinzo Okada, Saburo Magari and Kentaro Katsui. *Electrochemical Society, Journal,* v. 103, Oct. 1956, p. 557-561.

Thiourea gave the smoothest deposits, in which the facets of the deposit were parallel to the (120) planes of the base crystal. (L17, M27, Cu)

708-L. Plating in Pyrophosphate Baths. John Starr. *Industrial Finishing,* v. 9, Sept. 1956, p. 80-82.

Equipment, composition of plating electrolyte, processes and procedures, plating speed table. (L17, Ni, Cu)

709-L. Diffusion of Hydrogen Through Ceramic Coatings. *Industrial Heating,* v. 23, Oct. 1956, p. 2191-2192, 2194.

Study reveals that the ceramic reduces the hydrogen flow by a factor of about 20. Reported differences in the creep rates of bare metals in hydrogen and in air, and attributed this difference to the oxide layer formed on metal. (L27, Q3, N1, Ni)

710-L. Leveling Nickel. D. Gardner Foulke. *Metal Finishing,* v. 54, Oct. 1956, p. 52-56.

Effect of variables such as current density, temperature, pH and agitation upon the degree of leveling obtainable. (L17, Ni)

711-L. Cleaning Metals and Alloys. C. B. F. Young. *Metal Finishing,* v. 54, Oct. 1956, p. 57-60, 65.

Surface contaminants, polishing and buffing compounds, ultrasonic cleaning, removal of surface films. (To be continued.) (L10, L12)

712-L. Barrel Plating Equipment. J. B. Mohler. *Metal Finishing,* v. 54, Oct. 1956, p. 61-65.

Plating costs, typical operating sequence, recent developments, automatic plating, shape and size of parts. (L17)

713-L. Surface Treatment and Finishing of Light Metals. XI. Pt. 2, Properties of Anodic Coatings. S. Wernick and R. Pinner. *Metal Finishing,* v. 54, Oct. 1956, p. 66-69.

Corrosion resistance, effect of anodizing, mechanical properties. (L19, R general, EG-a)

714-L. Science for Electroplaters. XVIII. Electrolytes. L. Serota. *Metal Finishing,* v. 54, Oct. 1956, p. 71-72.

Current flow through electrolytes, changes in conductivity, Faraday's laws. (To be continued.) (L17)

715-L. Finishes for Aluminum Alloys. I. Electrolytic or Anodic Coatings. Walter E. Pocock. *Metal Progress,* v. 70, Oct. 1956, p. 75-78.

Anodizing increases corrosion resistance and improves appearance. Various processes and properties of resultant coatings. (L19, Al)

716-L. Developments in Sprayed Metal Coatings. Herbert S. Ingham. *Metalworking Production,* v. 100, Sept. 21, 1956, p. 1521-1525.

Advances in the design of powder spray guns now permit economical spraying of metal alloys and ceramic materials. Available spray guns are compared; fusing and other properties of the alloys are discussed. (L23)

717-L. Practical Aspects of Cadmium Plating. John Kosmos. *Plating,* v. 43, Oct. 1956, p. 1235-1240.

Composition of plating baths for different plating procedures and specifications. (L17, ST, Cd)

718-L. Notes on Post-Treatment for HAE Coatings. Harry Salmon and Fielding Ogburn. *Plating,* v. 43, Oct. 1956, p. 1241-1243.

Developed procedure for a dichromate-bifluoride post-treatment. Recommends that treated panels remain under ambient atmospheric conditions for three days if they are to be subjected to salt spray tests. (L19, Mg)

719-L. Plastisols. Tough Protective Coatings for Plating Equipment. D. R. Meserve. *Plating,* v. 43, Oct. 1956, p. 1244-1247.

Coating service, exposure tests, coating processes, comparative costs. (L26, L17)

720-L. Temporary Protective Coatings for Metals. I. Lanolin-Containing Materials. E. Strong. *Product Finishing,* v. 9, Sept. 1956, p. 50-58, 116.

Reviews early rust preventives and methods of application; new Lanolin applications and advantages over old methods. (L26, R10, ST)

721-L. Electroless Nickel Plating. D. J. Fishlock. *Product Finishing,* v. 9, Sept. 1956, p. 61-70.

Details of the process and the deposit produced and possible applications. (L14, Ni)

722-L. Techniques for Surface Treatment of Aluminum. Henry Walker. *Products Finishing,* v. 21, Oct. 1956, p. 44 + 6 pages.

Electrolytic and chemical polishing, anodizing, soft and enamel anodizing, sealing. (L general, Al)

723-L. Barrels Tumble $30,000 From Stampings Finishing Costs. Kenneth D. Higgins. *Tooling and Production,* v. 22, Oct. 1956, p. 103-105.

Modern equipment and new techniques employed in a progressive barrel finishing system. (L10, ST)

724-L. (Finnish.) **Protective Coatings for Industrial Atmospheres. II.** Veikko Tolvanen. *Teknillisen Kemian Aikakauslehti,* v. 13, no. 14, Sept. 1956, p. 470, 473-474, 476.

Binders, systems of paint layers, criteria for the selection of protection for structures under different circumstances, maintenance and inspection of coatings. (L26)

725-L. (French.) **Sand Blast and Peening of Light Alloys.** Francois Flushin. *Corrosion et Anticorrosion,* v. 4, no. 8, Sept. 1956, p. 276-280.

A study of both processes for surface preparation before anticorrosive coating and of the choice between various types of sand and shots. (L10, G23, EG-a)

726-L. (French.) **Phosphatization and Anticorrosion.** Roger Lagarde. *Corrosion et Anticorrosion,* v. 4, no. 8, Sept. 1956, p. 289-296.

The principle of anticorrosive phosphatization, the deep and light processes, types of coating, and application of the principle to nonferrous metals. (L14, EG-a)

727-L. (French.) **Improving Oxidation and Wear Resistance Through Nonelectrolytic Deposition of Nickel.** A. Portalupi and E. Melgara. *Métallurgie et la Construction Mécanique,* v. 88, no. 9, Sept. 1956, p. 747-749, 751, 753.

Chemical nickel plating compared to electrolytic process. Better protection of edges by chemical coating. (L14, Ni)

728-L. (German.) **Studies of the Mechanism of Brightening the Surface of Aluminum and Aluminum Alloys. I.** F. Baumann and H. Ginsberg. *Aluminium,* v. 32, no. 10, Oct. 1956, p. 643-648.

Disintegration of aluminum crystals in corrosive media; conditions obtained during attack by a special brightening solution; influence of trace elements. (L12, Al)

729-L. (German.) **Applications of Ultrasonics in Surface Treatment of Metals. Cleaning by Means of Piezo-Oscillations.** P. Wenk. *Metalloberfläche,* v. 10, no. 9, Sept. 1956, p. 257-260.

Methods and equipment using a frequency of 20 kc. per sec. (L10)

730-L. (German.) **Cleaning With Ultrasonic Devices.** A. Graul. *Metalloberfläche,* v. 10, no. 9, Sept. 1956, p. 260-262.

Ultrasonic waves are applied for cleaning large items in a liquid medium. (L10)

731-L. (German.) **Problems of Ultrasonic Application in Surface Treatment of Metals.** K. Frölich. *Metalloberfläche,* v. 10, no. 9, Sept. 1956, p. 262-265.

Ultrasonics in galvanic bath, cleaning with ultrasonics, application of ceramic and quartz transducers, use of vacuum. (L10)

732-L. (Russian.) **Hydraulic Abrasive Blasting of Metal Parts.** N. G. Markov, F. V. Kisliakov and M. M. Trukhachev. *Vestnik Mashinostroeniia,* v. 36, no. 9, Sept. 1956, p. 56-57.

Describes a machine designed for treating metallic surfaces with liquids carrying an abrasive material. The treatment is claimed not only to be free from the usual defects of other machining methods, but also to improve the fatigue strength and corrosion resistance of the part treated. (L10, G17)

733-L. (Spanish.) **High Temperature Aluminizing of Steel.** Justo Ferrer Flotats. Paper from "XXVIII Congreso Internacional de Quimica Industrial". v. I. Saez, p. 343-347.

Study of aluminum fusion coating. Coating is thinner and offers better resistance to corrosion and to oxidation at temperatures above 250° C. (L16, Al)

734-L. (Spanish.) **Anticorrosive Electrolytic Coating of Iron and Steel in Precision Machinery.** S. Terol Alonso and C. Fernandez de Garcia Andrade. Paper from "XXVIII Congreso Internacional de Quimica Industrial". v. I. Saez, p. 376-381.

A study of the anticorrosive behavior of electrodeposited metals—alone or in combination—on precision parts leads to selecting the cadmium-nickel system, with chromium or rhodium, as the best protection in humid, salt atmospheres. (L17, R3, Cd, Ni, Cr, Rh)

735-L. Vacuum Metallizing in a Custom Shop. Allan S. Kothe, *Industrial Finishing,* v. 32, Oct. 1956, p. 56 + 5 pages.

Modern equipment makes process practical and permits the coating of any nonporous solid with aluminum, gold, copper, iron, selenium, nickel and copper alloys. (L25)

736-L. Glass on Aluminum. E. A. Farrell. *Modern Metals,* v. 12, Oct. 1956, p. 66 + 8 pages.

Technique is expected to open new markets for both the process and the metal. Details of method, advantages and limitations, present and potential applications. (L27, Al)

737-L. Hot Dip Wire Aluminizing Processes and Alloys. J. D. Sprowl. *Wire and Wire Products,* v. 31, Oct. 1956, p. 1160-1163, 1273-1277.

Requirements for successful aluminizing, procedures and equipment, aluminizing alloys, comparison with galvanizing. (L16, Al)

738-L. Continuous Production Electroplating of Tin on Copper Wire Using Alkaline Potassium Stannate Bath. M. K. Schurter and R. T. Gore. *Wire and Wire Products,* v. 31, Oct. 1956, p. 1201 + 5 pages.

Process layout and operation; comparison with hot-dip method. (L17, Sn)

739-L. (German.) **Investigation of Secondary Structure of Anodic Deposits of Aluminum by Means of Dye Absorption. I. Overlapping Main Deposit Layers.** Th. Skulikidis, S. Karalis and P. Mentojiannis. *Kolloid-Zeitschrift,* v. 149, no. 1, Oct. 1956, p. 6-10.

Detection of structures by means of organic dyestuff in both. (L19, M23, Al)

740-L. (German.) **Titanium Coating of Metals and Ceramics.** M. E. Straumanis and A. W. Schlechten. *Metall,* v. 10, no. 19-20, Oct. 1956, p. 901-909.

New methods of titanium coating in melted salt containing a titanium-dispersion. (L14, Ti)

741-L. (Russian.) **Supertension in Electrolytic Deposition of Metals, and the Zero Points.** L. I. Antropov. *Uspekhi Khimii,* v. 25, no. 8, Aug. 1956, p. 1043-1056.

Present state of the problem. (L17)

742-L. (Russian.) **Anodic Dissolution of Ferrochromium in Solutions of Sodium Carbonate and Sodium Hydroxide.** R. I. Agladze and T. V. Ionatamishvili. *Zhurnal Prikladnoi*

Khimii, v. 29, no. 9, Sept. 1956, p. 1365-1372.

A study of the dependence of anode yields of chromium on the concentration of sodium carbonate. Yield reaches a maximum in the range from 106 to 212 g. per liter. Advantages of sodium hydroxide over sodium carbonate. (L19, Fe, Cr)

743-L. (Russian.) The Effect of Chlorine on the Dissolution of the Nickel Anode. A. V. Pomosov and L. I. Gurevich. *Zhurnal Prikladnoi Khimii*, v. 29, no. 9, Sept. 1956, p. 1372-1377.

The depassivation effect of chlorine ions depends on their concentration in the electrolyte. For concentrations up to 1 gram equivalent per liter, there are three distinct concentration ranges in which chlorine ions have different depassivation effects. (L17, Ni)

744-L. (Russian.) Nonstationary Processes in Electrolysis of Copper and Nickel Solutions. G. A. Emel'ianenko and V. P. Galushko. *Zhurnal Fizicheskoi Khimii*, v. 30, no. 8, Aug. 1956, p. 1710-1717.

Concentration polarization. Effect of surface-active substances and of preliminary treatment of cathode surface. (L17, Cu, Ni)

745-L. Properties, Specifications, Tests and Recommendations for Coal Tar Coatings. I. Hot Applied Coatings. W. F. Fair, Jr., *Corrosion*, v. 12, Nov. 1956, p. 579-587.

Fundamental properties, long-term service characteristics, specification writing and testing for various kinds of hot applied coal tar enamels. (L26)

746-L. The Trend of Protective Metal Spraying Practice. W. E. Stanton. *Corrosion Technology*, v. 3, Oct. 1956, p. 311-313.

Equipment, methods, advantages of mechanical treatment, British facilities. (L23, Zn, Al)

747-L. Sprayed Aluminium and Zinc in Corrosive Environments. R. E. Mansford. *Corrosion Technology*, v. 3, Oct. 1956, p. 314-316.

Coatings are produced by atomizing molten metal in a stream of compressed air. The metal is supplied to the spraying pistol either as a wire or a powder and is melted in an oxygen-fuel gas flame. (L23, Al, Zn)

748-L. Metallized Coatings for Heat Corrosion Protection. J. R. Franklin. *Corrosion Technology*, v. 3, Oct. 1956, p. 326-327.

The most convenient method of applying a thin layer of aluminum is by metal spraying. Consistent results are readily obtained, and the size of the article presents no difficulty. (L23, Fe, Al)

749-L. "Kanigen" Chemical Nickel Plating. G. Gutzeit and E. T. Mapp. *Corrosion Technology*, v. 3, Oct. 1956, p. 331-336.

Method for uniformly coating metals and nonmetals with a layer of hard, corrosion-resistant amorphous nickel-phosphorus alloy. Nonporous coating is hard but relatively brittle, adheres well to most properly pretreated basis materials. (L14, Ni)

750-L. Choosing the Right Aluminum Coating. Jack H. Goodyear. *Light Metal Age*, v. 14, Oct. 1956, p. 19-22.

Sulphuric and chromic acid types of anodizing; properties and uses of anodized metals. (L19, Al)

751-L. Electrolytic and Chemical Polishing. Pierre A. Jacquet. *Metallurgical Reviews*, v. 1, pt. 2, 1956, p. 157-238 + 16 plates.

Surface state of metal, history, principles, mechanism and techniques of polishing processes, comparison of characteristics of surfaces polished mechanically, electrolytically and chemically. (L12, L13)

752-L. Addition Agents in Nickel Plating. Robert B. Fischer and Charles E. Ring. *Plating*, v. 43, Nov. 1956, p. 1338-1341.

Investigates certain phases of the brightening mechanism of addition agents by isolating the effects of the addition agent from the effects of all other conditions and components of the plating bath. (L17, Ni)

753-L. Barrel-Finishing Principles. Selecting the "Best" Burnishing Barrel. H. Leroy Beaver. *Products Finishing*, v. 21, Nov. 1956, p. 60-62, 64.

Shape, weight and resistance to permanent deformation of the parts being burnished must always be taken into consideration. Barrel that will exert the maximum of pressure without deforming the parts is most desirable. (L10)

SECTION M

METALLOGRAPHY, CONSTITUTION and PRIMARY STRUCTURES

1-M. The Inner Structure of Alnico 5. E. A. Nesbitt and R. D. Heidenreich. *Bell Laboratories Record,* v. 33, Nov. 1955, p. 405-409.

New theory in experimental phase may result in more powerful magnets. Photographs, diagrams, graph. (M26, M27, SG-n)

2-M. Textures in Face-Centered Cubic Metals and Alloys. R. E. Smallman. *Institute of Metals, Journal,* v. 23, Sept. 1955, p. 10-18.

Results interpreted in terms of solute "atmosphere" locking; predictions of characteristic slip behavior made. Diagrams, graphs. tables. 37 ref. (M26)

3-M. Electrolytic Polishing Technique for Metallographic Specimens in Routine Quality Control. P. M. H. Chawner. *Metal Treatment and Drop Forging,* v. 22, Oct. 1955, p. 427-429, 432.

Use of fast-flowing electrolyte, mechanism of electropolishing, use of rotating cathode. Micrographs, diagram, photograph. 5 ref. (M21)

4-M. Formation of Etch Pits on Slip Lines in Aluminium. G. Wyon and J. M. Marchin. *Philosophical Magazine,* v. 46, 7th ser., no. 381, Oct. 1955, p. 1119-1122.

Experimental results show that revealing dislocations by micrography in metallic lattices in rarely simple and that it is necessary to perfect etching reagents which are more sensitive, reproducible and selective. 10 ref. (M26, M21, Al)

5-M. (English.) **An Interferometric Study of Grain Boundary Grooves in Tin.** H. Mykura. *Acta Metallurgica,* v. 3, no. 5, Sept. 1955, p. 436-441.

Because of specimen shape and method of its support, groove formation, by a mechanism depending on simultaneous grain-boundary sliding and migration, occurred. Micrographs, diagrams. 12 ref. (M27, Sn)

6-M. (English.) **Stacking Faults in Cold Worked Alpha-Brass.** B. E. Warren and E. P. Warekois. *Acta Metallurgica,* v. 3, no. 5, Sept. 1955, p. 473-479.

Stacking fault probability increases with increasing zinc content. Tables, graphs. (M26, Cu)

7-M. (English.) **The Lattice Spacings of Close-Packed Hexagonal 3/2 Electron Compounds.** G. V. Raynor and T. B. Massalski. *Acta Metallurgica,* v. 3, no. 5, Sept. 1955, p. 480-486.

Spacings in the system copper-gallium-germanium determined as a function of composition and electron atom ratio, using alloys quenched from 550° C. Graphs, table, diagram. 9 ref. (M26, Ge, Ga, Cu)

8-M. (English.) **The Elastic Interaction of Point Defects.** J. D. Eshelby. *Acta Metallurgica,* v. 3, no. 5, Sept. 1955, p. 487-490.

Summarizes the known results for interaction when they are idealized as centers of dilation in an isotropic elastic continuum and extends them to the case of cubic anisotropy. 14 ref. (M26)

9-M. (English.) **Plastic Deformation of Copper Crystals Under Alternating Tension and Compression.** M. S. Paterson. *Acta Metallurgica,* v. 3, no. 5, Sept. 1955, p. 491-500.

Strain hardening of high-purity single crystals during cycles of reversed plastic strain shown to depend on orientation. Diagrams, graphs, micrographs. 29 ref. (M26, Q24, Cu)

10-M. (English.) **The Influence of Some Alloying Constituents on the Structure of Cast Aluminium.** A. Domony and C. R. Vassel. *Acta Technica Academiae Scientiarum Hungaricae,* v. 12, nos. 1-2, 1955, p. 157-164.

Effect of various alloying elements

and impurities on the primary grain size of the cast metal. Titanium surpassed other elements for grain refining and mode of crystallization. Table. 16 ref. (M27, N12, Al)

11-M. (Russian.) **Analogs of Tungsten Bronzes.** E. I. Krylov. *Doklady akademii nauk SSSR*, v. 104, no. 2, Sept. 11, 1955, p. 246-248.

Composition and properties, interplane distances, intensity of lines, parameters of crystal lattices of columbium bronzes. Tables. 4 ref. (M26, Q general, Cu)

12-M. (Russian.) **Contemporary Ideas About the Structure of Alloys in Connection With the Problem of Strength.** I. L. Mirkin. *Metallovedenie i obrabotka metallov*, 1955, no. 1, July, p. 11-18.

Atomic structure and properties of metals; imperfections in crystals and peculiarities of the basic lattice; various types of heat treatment and alloying elements in steels, aluminum, and other metals. 31 ref. (M25, M26, J general, AY, Al, Ni, Ti, Cr)

13-M. (Russian.) **Crystal Structure of the Compounds, $CrBe_{12}$, VBe_{12}, and $CbBe_{12}$.** P. I. Kripiakevich and E. I. Gladyshevskii. *Doklady akademii nauk SSSR*, v. 104, no. 1, Sept. 1, 1955, p. 82-84.

Determination of the coordination numbers and interatomic distances in the structures. X-ray study of the powders of these compounds. Tables. 9 ref. (M26, Cr, V, Cb, Be)

14-M. (Russian.) **New Kurnakov-Type Compound, Fe_3V, in the Iron-Vanadium System.** I. I. Kornilov and V. S. Mikheev. *Doklady akademii nauk SSSR*, v. 104, no. 1, Sept. 1, 1955, p. 88-90.

Effects of gradual cooling and of long quenching periods, at temperatures below the transformation point, on the distribution of atoms in the crystal lattice; electrical resistivity, temperature coefficient and hardness of quenched and tempered alloys; composition-property diagrams of alloys of the system. Table, phase diagrams. 3 ref. (M24, M25, Fe, V)

15-M. Phase Relations in Magnesium-Lithium-Aluminum Alloys. D. W. Levinson and D. J. McPherson. *American Society for Metals, Transactions*, v. 48, *Preprint No.* 44, 1955, 23 p.

Relations established by metallographic and X-ray diffraction analysis at 400, 300, 200 and 100° C. Verifies existence of ternary phase at approximately the stoichiometry of $MgLiAl_2$. Graphs, diagrams, micrographs, tables. 9 ref. (M24, Mg, Li, Al)

16-M. The Constitution of Indium-Arsenic-Antimony Alloys. C. H. Shih and E. A. Peretti. *American Society for Metals, Transactions*, v. 48; *Preprint No.* 45, 1955, 23 p.

Alloys investigated over the entire compositional range by thermal analysis, microscopic and X-ray methods and no ternary compounds were found to exist. Composition and melting points of intermetallic compounds determined. Tables, graphs, micrographs. 9 ref. (M24, In, As, Sb)

17-M. The Nature of the Thermal Agitation in Crystals. C. V. Raman. *Indian Academy of Sciences. Proceedings*, v. 42, sec. A, Oct. 1955, p. 163-174.

Determination of nature of atomic movements that constitute thermal agitation in a crystal. (M26, M25)

18-M. The Constitution of the Titanium-Oxygen Alloys in the Range 0-35 Weight Per Cent Oxygen. T. H. Schofield and A. E. Bacon. *Institute of Metals, Journal*, v. 84, Oct. 1955, p. 47-53 + 2 plates.

Differs from previous work in regard to limits of the phase fields. Diagrams, tables micrographs. 24 ref. (M24, Ti)

19-M. Non-Destructive Metallography of Plain Carbon Steels. K. Sachs and J. D. Bunton. *Metallurgia*, v. 52, no. 312, Oct. 1955, p. 205-209.

Chemical polishing enables the effectiveness of heat treatment to be checked with greater certainty than by other means. Photographs, table, micrographs. 2 ref. (M21, J general, CN)

20-M. Phase Realtions in Mg-Li-Zn Alloys. A. F. Weinberg, D. W. Levinson and W. Rostoker. *American Society for Metals, Transactions*, v. 48, *Preprint No.* 47, 1955, 23 p.

Study by methods of metallographic thermal and X-ray diffraction analysis, with isothermal sections presented for temperatures of 400, 300, 200 and 100° C. A ternary phase of wide miscibility was identified, but the ternary phase $MgLi_2Zn$ was not found to be an equilibrium phase at any of the temperatures studied. Tables, graphs, micrographs. 6 ref. (M24, Mg, Li, Zn)

21-M. Compilation of U. S. and U. K. Uranium and Thorium Constitutional Diagrams. H. A. Saller and F. A. Rough. *Battelle Memorial Institute (U. S. Atomic Energy Commission)*, BMI-1000, June 1955, 141 p.

Presents 92 binary and ternary systems comprising data from several sources which are correlated with most recent available findings. Phase diagrams. 376 ref. (M24, U, Th)

22-M. The Scanning Electron Microscope and Its Fields of Application. K. C. A. Smith and C. W. Oatley. *British Journal of Applied Physics,* v. 6, Nov. 1955, p. 391-399.

Experience with the scanning electron microscope has shown that there are fields of application where this instrument has distinct advantages over the conventional transmission microscope (with or without replicas) and the reflection electron microscope. For example, there are specimens which are too thick to be viewed by direct transmission and which nevertheless do not lend themselves readily to the construction of replicas. Maps. 10 ref. (M21)

23-M. System Aluminium-Antimony. H. W. L. Phillips. *Institute of Metals, Annotated Equilibrium Diagrams, No.* 15, Oct. 1955, 3 p.

Includes diagram, table. 7 ref. (M24, Sb, Al)

24-M. System Aluminium-Iron. H. W. L. Phillips. *Institute of Metals, Annotated Equilibrium Diagrams, No.* 13, Sept. 1955, 5 p.

Includes diagrams, table. 18 ref. (M24, Fe, Al)

25-M. System Aluminium-Manganese. H. W. L. Phillips. *Institute of Metals, Annotated Equilibrium Diagrams, No.* 17, Oct. 1955, 5 p.

Includes diagram, table. 14 ref. (M24, Mn, Al)

26-M. System Aluminium-Nickel. H. W. L. Phillips. *Institute of Metals, Annotated Equilibrium Diagrams, No.* 18, Oct. 1955, 5 p.

Includes diagram, table. 11 ref. (M24, Ni, Al)

27-M. System Aluminium-Tin. H. W. L. Phillips. *Institute of Metals, Annotated Equilibrium Diagrams, No.* 14, Sept. 1955, 3 p.

Includes diagram, table. 7 ref. (M24, Sn, Al)

28-M. The Copper-Rich Alloys of the System Copper-Aluminium-Indium. P. H. Stirling and G. V. Raynor. *Institute of Metals, Journal,* v. 84, Nov. 1955, p. 57-65.

Partial isothermal equilibrium diagrams for eight temperatures between 550 and 720° C. Results discussed in relation to theory of ternary alloys. Diagrams, graphs, tables. 12 ref. (M24, Cu)

29-M. The Constitution of the Copper-Rich Copper-Gallium-Germanium Alloys. G. V. Raynor and T. B. Massalski. *Institute of Metals, Journal,* v. 84, Nov. 1955, p. 66-72.

Isothermal equilibrium diagrams have been determined at 725, 625, 550 and 450° C. There is no fundamental difference between the hexagonal phases of limited homogeneity formed in the solid state at electron; atom ratios near 1.5, and those of wide homogeneity range which are stable from room temperature to the melting point. Diagrams. 10 ref. (M24, Cu)

30-M. Uranium-Chromium System. A. H. Daane and A. S. Wilson. *Journal of Metals,* v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Nov. 1955, p. 1219-1220.

The eutectic-type system has some solid solubility of chromium in gamma and beta uranium. The eutectic occurs at 20 atomic % chromium and melts at 859° C. Micrographs, diagram. (M24, U, Cr)

31-M. Liquid Metals. II. X-Ray Diffraction by Liquid Mercury and the Distance of Closest Atomic Approach. Joseph S. Lukesh. William H. Howland, Leo F. Epstein, and Marion D. Powers. *Journal of Chemical Physics,* v. 23, Oct. 1955, p. 1923-1924.

Resolves vapor viscosity value of 3.25 A with the diffraction value of 3.00 A. 14 ref. (M22, Hg)

32-M. The Structure of Electrodeposited Metals. Rolf Weil and Harold J Read. *Metal Finishing,* v. 53, Dec. 1955, p. 60-64.

Nickel deposits. Micrographs. 14 ref. (M26, M27, L18, Ni)

33-M. Thermal Vibrations of Atoms in Cubic Crystals. I. The Temperature Variation of Thermal Diffuse Scattering of X-Rays by Lead Single Crystals. II. The Amplitude of Atomic Vibrations. L. Cartz. *Physical Society, Proceedings,* v. 68, no. 431B, Nov. 1, 1955, p. 951-967.

Intensity of thermal diffuse scattering of X-rays decreases with temperature increase for scattering near to high order reciprocal lattice points for crystals of low Debye characteristic temperature. The Lindemann relationship between the Debye characteristic temperature and the melting point may also be obtained from a consideration of the temperature variation of thermal diffuse X-ray scattering. Tables, graphs. 49 ref. (M26, M22, Pb)

34-M. High-Resolution X-Ray Projection Microscopy. W. C. Nixon. *Royal Society, Proceedings,* v. 232, ser. A, Nov. 22, 1955, p. 475-485 + 1 plate.

X-ray shadow projection microscope has been limited previously to a resolution of 0.5μ. A resolution of 0.1μ has now been achieved with the same exposure time of 5 min. This has been done by using a very thin gold-leaf X-ray target (0.1μ thick) to avoid enlargement of the point source of X-rays due to electron scattering in a thick target. Diagram, graphs, micrographs. 29 ref. (M21)

35-M. Metallography of Aluminum and Its Alloys. Use of Electrolytic Polishing. P. A. Jacquet. *U. S. National Advisory Committee for Aeronautics, Technical Memorandum* 1384, Nov. 1955, 80 p.

Methods for electropolishing aluminum and aluminum alloys. Description of a commercial electrolytic polishing unit, suitable for micrographic examination of aluminum and its alloys. Photographs, diagrams, micrographs, tables. 34 ref. (M21, Al)

36-M. Metallography of Zirconium. H. P. Roth. Paper from "The Metallurgy of Zirconium". National Nuclear Energy Series, Division VII—v. IV. McGraw-Hill Book Co., p. 709-732.

Sample preparation, etchants, photography, optical and electron microscopy. Photographs, micrographs. 37 ref. (M21, Zr)

37-M. (German.) **Electron Diffraction on Surface of Copper Monocrystals at High Temperature.** Chr. Menzel-Kopp and E. Menzel. *Zeitschrift für Physik,* v. 142, no. 3, 1955, p. 245-258.

Temperature influence on the electron diffraction in the case of reflection or irradiation of crystals. Diagram, graphs, electron diffractograms. 23 ref. (M22, Cu)

38-M. (Book.) **Microscopy of Ceramics and Cements, Including Glasses, Slags, and Foundry Sands.** Herbert Insley and Van Derck Fréchette. 286 p. 1955. Academic Press Inc., 125 E. 23rd St., New York, N. Y.

Microscopes and accessories; optical mineralogy; specimen preparation; thermal behavior of materials. (M21, E18)

39-M. Surface Metallography Solves Production Problems. A. T. Steer. *American Machinist,* v. 99, Dec. 19, 1955, p. 109-120.

Use of high-power magnification to determine causes of failure in storage or service. Photographs, micrographs. (M21, S21)

40-M. X-Ray Microscopy. W. C. Nixon. *Research,* v. 8, Dec. 1955, p. 473-483.

Development, merits and limitations of each, form of X-ray microscopes, based on the principles of reflection, contact and projection. Diagrams, photographs, micrographs. 102 ref. (M21)

41-M. (French.) **Direct Microscopic and Electronic Diffraction Examination of Metals.** R. Castaing. *Revue de métallurgie,* v. 52, no. 9, Sept. 1955, p. 669-675.

Specimens thin enough to allow for direct and high resolution electron-microscope examination and for simultaneous inspection by means of localized electron diffraction are prepared by ion bombardment. Micrographs, photograph, diagram. 12 ref. (M21, M22)

42-M. (German.) **Investigation of the System Vandium-Arsenic.** K. Bachmayer and H. Nowotny. *Monatshefte für Chemie,* v. 86, no. 5, Oct. 1955, p. 741-744.

Determination and crystallographic specifications of a new crystal type having a composition similar to that of V_2As. Tables. 9 ref. (M24, As, V)

43-M. (German.) **Fundamental Relationship Between Dislocation Density and Stress Functions.** Ekkehart Kröner. *Zeitschrift für Physik,* v. 142, no. 4, 1955, p. 463-475.

Mathematical analysis of fundamental equations of non-symmetrical dislocations.. Diagrams. 6 ref. (M26, Q25)

44-M. (Italian.) **Structural Changes Produced by Phosphorus in Complex Hypereutectic Heat Resisting Al-Si-Ni-Cu-Mg Alloys.** U. Gandolfi and D. Gualandi. *Metallurgia italiana,* v. 47, no. 10, Oct. 1955, p. 465-473.

Effect of small additions in the form of phosphor pentachloride or phosphor-bearing copper, on grain size and properties. Diagrams, photographs, micrographs, tables. 11 ref. (M27, Al)

45-M. Effects of Pressure on Binary Alloys. III. Five Alloys of Thallium, Including Thallium-Bismuth. IV. Six Alloys of Bismuth. P. W. Bridgman. *American Academy of Arts and Sciences,* v. 84, no. 1, p. 1-109.

Complications in phase diagrams resulting from the presence of the pressure transitions of the main components. Tables, graphs, phase diagram. 22 ref. (M24, Tl, Bi)

46-M. Instrumentation in Crystal Mechanics. A. J. Kennedy. *Instrument Practice,* v. 9, Nov. 1955, p. 1052-1056.

Basic mechanical problem, geometric and profile devices, and the

use of an electrical extensometer. Special problems summarized. Diagrams. 11 ref. (M23)

47-M. The Electronic Energy Band Structure of Silicon and Germanium. Frank Herman. *I. R. E., Proceedings,* v. 43, Dec. 1955, p. 1703-1732.

Introduction to the quantum theory of crystals, covering the theory energy of bands in a perfect crystal, structure and relationship between some of the electrical and optical properties. Diagrams, graphs. 71 ref.
(M25, P15, P17, Si, Ge)

48-M. The Structure of Lithium-Magnesium Solid Solutions. II. Measurements of Diffuse X-Ray Scattering. F. H. Herbstein and B. L. Averbach. *Massachusetts Institute of Technology, Department of Metallurgy (U. S. Atomic Energy Commission),* NYO-7050, Sept. 1955, 23 p.

A preference for unlike nearest neighbors is indicated by diffuse X-ray scattering data from BCC solutions of lithium-magnesium alloys. Individual atoms are displaced from average lattice sites. The lithium-magnesium interatomic distance is shorter than the average of the distances between like atoms. Graphs. 13 ref. (M26, Li, Mg)

49-M. Metallography of Thorium. R. J. Gray and M. J. Feldman. *Metallurgy Development Advisory Comittee (U. S. Atomic Energy Commission),* TID-5117, Feb. 1952, 27 p.

A compilation of notes from the Fifth Metallographic Conference, Westinghouse Atomic Power Division, on the preparation of a series of thorium samples. Micrographs, tables. (M21, Th)

50-M. The Lattice Spacings of Solid Solutions of Titanium, Vanadium, Chromium, Manganese, Cobalt and Nickel in Alpha-Iron. A. L. Sutton and W. Hume-Rothery. *Philosophical Mayazine,* v. 46, 7th ser., no. 383, Dec. 1955, p. 1295-1309.

Measurements of the lattice spacings in alpha-iron, formed by the elements from titanium to nickel, are compared with solid solutions in ruthenium formed by the corresponding elements in the Second Long Period and with those obtained for solid solutions in nickel. Tables, graphs. 17 ref.
(M26, Ti, V, Cr, Mn, Co, Ni, Fe)

51-M. Surface Distributions of Dislocations in Metals. C. J. Ball and P. B. Hirsch. *Philosophical Magazine,* v. 46, 7th ser., no. 383, Dec 1955, p. 1343-1352.

Experimental data on the nature of dislocation boundaries in deformed crystals. Tables, diagrams. 17 ref. (M26)

52-M. Effects of Defects on Lattice Vibrations. Elliott W. Montroll and Renfrey B. Potts. *Physical Review,* v. 100, ser. 2, Oct. 15, 1955, p. 525-543.

Theory of the effect of localized defects, such as impurities, holes and interstitials, on the vibrations of crystal lattices. Although most of the analysis is concerned with one-dimensional chains, the general approach to defects in three-dimensional lattices is outlined through the example of a simple cubic lattice with nearest-neighbor interactions. Diagrams, graphs. 12 ref.
(M26)

53-M. The Crystal Chemistry of Non-Stoichiometric Compounds. A. D. Wadsley. *Reviews of Pure and Applied Chemistry,* v. 5, Sept. 1955, p. 165-193.

Examines structural changes accompanying departures from ideal composition, and discusses ordering of defects, crystalline solids, substitutional and interstitial systems, and tunnnel and layer-compounds. Diagrams, tables. 184 ref. (M26)

54-M. Some Modifications and Techniques Applied to the RCA Type EMU Electron Microscope. F. W. Bishop. *University of California, Los Angeles Campus, School of Medicine (U. S. Atomic Energy Commission),* UCLA-354, Nov. 1955, 33 p.

Compilation of unpublished information on small modifications or improvements in the electron microscope which have been made within the last 5 or 6 yr. Diagrams, micrographs, photograph. (M21)

55-M. (French.) Appearance of Surface Microstructures in Iron-Chromium Alloys Subjected to a Selective Oxidation Reaction. Jean Moreau and Jacques Bénard. *Comptes rendus,* v. 241, no. 22, Nov. 28, 1955, p. 1571-1573.

Analysis of the mechanism of selective oxidation of chromium and iron-chromium alloys in the presence of hydrogen and water vapor mixtures. Micrographs. 7 ref.
(M27, R2, Fe, Cr)

56-M. (French.) Role of the Porosity of Cast Steel in the Segregation of Hydrogen. Jean Drain and Paul Bastien. *Comptes rendus,* v. 241, no. 22, Nov. 28, 1955, p. 1573-1575.

Study of relationship between hydrogen content and porosity in steel ingots. Diagrams. 3 ref.
(M28, D9, CI)

57-M. (French.) New Sodium Bisulfite Micrographic Reagent for Steels.

L. Beaujard and J. Tordeux. *Revue de métallurgie,* v. 52, no. 9, Sept. 1955, p. 750-756.

Process reveals physical, chemical and structural characteristics in an improved fashion. Micrographs, photograph, graph. 7 ref. (M21, ST)

58-M. (German.) **Investigation of a Binary Metallic System by the Amalgam Method. System Nickel-Tin.** F. Lihl and H. Kirnbauer. *Monatshefte für Chemie,* v. 86, no. 5, Oct. 1955, p. 745-751.

Nickel-tin system shows only one phase at compositions up to 50 at. % tin. At higher tin contents several phases are present. Table, diffractograms, diagrams. 17 ref. (M24, Hg, Ni, Sn)

59-M. (German.) **Formation of Type M_5Si_3 Silicides.** E. Parthé, B. Lux and H. Nowotny. *Monatshefte für Chemie,* v. 86, no. 5, Oct. 1955, p. 859-867.

Determination of the second modification of Cb_5Si_3 and Ta_5Si_3 whose phases crystallize in the same manner as Cr_5B_3. Reviews other silicides with 33 to 45 at. % silicon. Tables, diagrams. 21 ref. (M26, Cb, Ta, Si)

60-M. (German.) **Uniform Statistical Treatment of the Problem of Valence-Electrons in Metals.** W. R. Theis. *Zeitschrift für Physik,* v. 142, no. 5, 1955, p. 511-517.

By utilizing statistical treatment of valence and inner electrons the known pressure-density relation of aluminum is extended to the zero-pressure point. This process can be applied to all metals where the smallest electron density is several times greater than that of the alkali metals. Graph. 14 ref. (M25)

61-M. (Norwegian.) **Structure and Properties of Electrolytically Deposited Metals.** Frithjof Dyngvold. *Teknisk ukeblad,* v. 102, no. 42, Nov. 17, 1955, p. 913-918.

Reviews new data reported at the metallurgical meeting of 1955 at the University of Birmingham on adhesion and mechanical properties of electrodeposits. Tables. 3 ref. (M27, L17)

62-M. (Russian.) **Certain Phenomena Observed in the Electron Microscope on a Tungsten Mono-Crystal Surface in the Presence of Gases.** S. Z. Roginskii and I. I. Tret'iakov. *Doklady akedemii nauk SSSR,* v. 105, no.1, Nov. 1, 1955, p. 112-114.

Study of adsorbed molecules on tungsten single crystals under a vacuum. Diagram, micrographs. 4 ref. (M26, W)

63-M. Simple Adaptation of the Carbon Replica Technique for the Examination of Selected Areas in the Electron Microscope. D. E. Bradley. *British Journal of Applied Physics,* v. 6, Dec. 1955, p. 430-432.

Includes micrographs, diagrams. 7 ref. (M21)

64-M. Siliceous Inclusions. R. E. Lismer and F. B. Pickering. *Iron & Steel,* v. 28, Nov. 30, 1955, p. 589-591; disc., p. 631-633.

X-ray analysis of residues from several ingots deoxidized by silicon. Tables, micrographs. (M22, Fe)

65-M. Titaniferous Inclusions. F. B. Pickering. *Iron & Steel,* v. 28, Nov. 30, 1955, p. 591-593; disc., p. 631-633.

A microscopical examination of iron samples under normal vertical illumination and polarized light; crystalline constituents of ingot residues determined by X-ray analysis of alcoholic iodine residues. Micrographs, table. (M27, M22, Ti)

66-M. Metallography of Delta-Ferrite. I. Eutectoid Decomposition. II. Formation of Delta-Eutectoid in 18-4-1 Type High-Speed Steels. III. Isothermal Transformation of Delta-Ferrite in a Low-Carbon 27-5-1.5 Cr-Ni-Mo Steel. IV. Decomposition of Delta-Ferrite Between 650 and 1000° C. in a Low-Carbon 18-10-3 Cr-Ni-Mo Steel. V. Delta-Eutectoid and the Constitution Diagram of the Fe-M-C System. Kehsin Kuo. *Iron & Steel,* v. 28, Nov. 30, 1955, p. 593-620; disc., p. 633-635, 640.

Includes micrographs, graphs, tables, diagrams. (M21, N8, Fe)

67-M. Nondestructive Grain Size Measurements With Ultrasonics. D. L. Worlton. *Nondestructive Testing,* v. 13, Nov.-Dec. 1955, p. 24-26.

Degree to which ultrasonic energy is absorbed in traveling through brass related to the wave length associated with the ultrasonic waves and average grain diameter of the metal. A curve obtained establishes this relationship for cylindrical samples and suggests a means of quantitative measurement of diameters. Micrographs, graphs, photographs, diagram. (M23, M27, Cu)

68-M. Metallurgical Application of Wet-Process Autoradiography. George C. Towe, Henry J. Gomberg and J. W. Freeman. *Nondestructive Testing,* v. 13, Nov.-Dec. 1955, p. 36-39.

Methods of preparing metal specimens for autoradiographic examination, results obtained. Micrographs, diagram, table. 3 ref. (M23, ST, Ni)

69-M. X-Ray Intensity Measurements With Counter Tubes. W. Parrish. *Philips Technical Review,* v. 17, Jan.-Feb. 1956, p. 206-221.

Various problems involved in quantitative radiation intensity measurement with counter tubes. Diagrams, graphs, photographs, tables. 16 ref. (M22)

70-M. The Binding Energy of Nitrogen in a Dislocation. W. R. Thomas and G. M. Leak. *Physical Society, Proceedings,* v. 68, no. 432B, Dec. 1955, p. 1001-1007.

Equilibrium considered between nitrogen atoms in free solution and nitrogen atoms bound in dislocation sites. Value for the binding energy of nitrogen atoms in dislocation sites estimated as lying between 0.75 and 0.8 e.v. per nitrogen atom. Graphs, table. 12 ref. (M26, Fe, N)

71-M. Magnetic Domain Structure in Twinned Crystals of Silicon Iron. R. Street and E. O. Hall. *Physical Society, Proceedings,* v. 68 no. 432B, Dec. 1955, p. 1033-1037.

Examination, by colliod deposition techniques, of influence on domain structure caused by presence of twin bands. Diagram, graph. 8 ref. (M26, P16, Fe)

72-M. Modification of the Peierls-Nabarro Model for Edge Dislocation Core. H. B. Huntington. *Physical Society, Proceedings,* v. 68, no. 432B, Dec. 1955, p. 1043-1048.

Critical review of various assumptions implicit in the Peierls-Nabarro treatment of the core of an edge dislocation. 5 ref. (M26)

73-M. An Optically Focusing X-Ray Diffraction Camera. A. Franks. *Physical Society, Proceedings,* v. 68, no. 432B, Dec. 1955, p. 1054-1064.

To obtain low-angle diffraction photographs the focusing is accomplished by total external reflection either by one elastically bent optical flat to form a line focus, or by two crossed flats to form a point focus. The beam is partially monochromatized and its intensity is high. Diagrams, graphs. 22 ref. (M22)

74-M. The Structure of Cold Worked Gold. I. A Study by Electron Diffraction. P. B. Hirsch, A. Kelly and J. W. Menter. *Physical Society, Proceedings,* v. 68, no. 432B, Dec, 1955, p. 1132-1145.

Experimental results show that it is possible to obtain information about the structure from a detailed study of the number, shape and arrangement of spots on the transmission electron diffraction pattern from a thin foil. Diagrams, tables. 23 ref. (M21, M27, Au)

75-M. Nondestructive Determination of Grain Size in Metals. Nicholas Grossman. *Sylvania Electric Products, Inc. (U. S. Atomic Energy Commission),* SEP-184, Aug. 1955, 31 p.

Ultrasonic methods explored were through transmission and pulse technique, amplitude decay, back reflections counting. Results obtained on brass, steel and zirconium. Micrographs, diagrams, graphs, photographs, tables. 15 ref. (M27, Cu, ST, Zr)

76-M. Physical Metallurgy. A. R. Bailey. Paper from "Reports on the Progress of Applied Chemistry". v. XXXIX. Society of Chemical Industry, p. 85-104.

Metallographic techniques, deterioration of metal under stress, solidification process in metals, crystallization and structure of cast iron, solid-state transformations. 216 ref. (M general, N general, Fe, Zn)

77-M. (English.) **The Crystal Structure of Mo_5Si_3 and W_5Si_3.** Bertil Aronsson. *Acta Chemica Scandinavica,* v. 9, no. 7, 1955, p. 1107-1110.

Structure of W_5Si_3 determined using single crystal data. The relations between the W_5Si_3-structure and the $D8_8$- and Fe_3P-structures discussed. Diagrams, table. 11 ref. (M26, W, Mo)

78-M. (English.) **Theory of the Formation of Lattice Defects During Plastic Strain.** G. H. Van Bueren. *Acta Metallurgica,* v. 3, no. 6, Nov. 1955, p. 519-524.

Theory to show relation between plastic strain and concentration of vacancies, dislocations and interstitials; studies behavior of dislocation sources under a varying applied shear stress. Compares theoretical deductions and the strain dependence of the electrical resistivity of copper. 14 ref. (M26, Q24, Cu)

79-M. (English.) **Interaction Between Dislocations and Interstitial Atoms in Body-Centered Cubic Metals.** A. W. Cochardt, G. Schoek and H. Wiedersich. *Acta Metallurgica,* v. 3, no. 6, Nov. 1955, p. 533-537.

Theory of Cottrell and Bilby on the locking of dislocations extended. It was found that carbon atoms near an edge dislocation are spread out over all angles below the slip plane and are concentrated in a neighborhood of the slip plane rather than at positions just below the dislocation. Diagrams, graphs. 16 ref. (M26, Fe)

80-M. (English.) **A Surface Structure Observed on Electrolytically Polished**

Zinc. K. F. Hulme. *Acta Metallurgica,* v. 3, no. 6, Nov. 1955, p. 572-578.

Results indicate that the structure is not a revelation of an internal substructure or "mosaic" of the metal but is closely associated with the electropolishing process. Diagrams, graphs, micrographs, table. 22 ref. (M27, L13, Zn)

81-M. (English.) **The Quadrupole Moment of La^{139}.** Kiyoshi Murakawa. *Physical Society of Japan, Journal,* v. 10, no. 11, Nov. 1955, p. 927-929.

Hyperfine structure of the spectra of lanthanum (I) and lanthanum (II) was studied, and the data, together with an improved value of the screening correction of the *d*-electron, yielded the result that the quadrupole moment of lanthanum (139) is $(0.6 \pm 0.2) \times 10^{-24}$ sq. cm. Tables. 11 ref. (M25, La)

82-M. (English.) **Some Observations on Dislocations in Copper Crystals.** Hideji Suzuki. *Physical Society of Japan, Journal,* v. 10, no. 11, Nov. 1955, p. 981-995.

Well-developed octahedral and cubic faces have been obtained in recrystallized copper by annealing the material at a temperature close to the melting point. Micrographs, diagrams. 8 ref. (M26, J23, Cu)

83-M. (English.) **Observations of Dislocations Along Grain Boundaries in Germanium Crystals.** Jun'ichi Okada. *Physical Society of Japan, Journal,* v. 10, no. 11, Nov. 1955, p. 1018-1019.

Study of the dislocations, by means of the etching process, gave results which verify the properties of dislocations along the small-angle-of-misfit grain boundaries. Micrographs. 2 ref. (M26, Ge)

84-M. (English.) **On the Solution-Body Phenomenon and Anisotropy of Solution Rate in Zinc Crystal.** Mikio Yamamoto and Jiro Watanabé. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 7, no. 3, June 1955, p. 262-268.

Solution rate of zinc crystal in nitric acid was found to be isotropic. Circular rod crystals etched with concentrated and dilute hydrochloric acids formed solution bodies characteristics of their orientations. Table, diagrams, graph, photographs. 8 ref. (M26, Zn)

85-M. Physical and X-Ray Study of the Disilicides of Titanium, Zirconium, and Hafnium. Perry G. Cotter, J. A. Kohn and R. A. Potter. *American Ceramic Society, Journal,* v. 39, Jan. 1956, p. 11-12.

Examination of the properties shows the compounds to be too brittle and have no value as industrial hard materials. Table. 10 ref. (M26, Q23, Ti, Zr, Hf)

86-M. The Effect of Temperature on the Lattice Spacings of Indium. J. Graham, A. Moore and G. V. Raynor. *Institute of Metals, Journal,* v. 84, Dec. 1955, p. 86-87.

Thermal-expansion coefficients have been determined for pure indinum from −183 to 135° C., using X-ray methods. The *c* parameter shows a maximum at about room temperature. Graphs. 7 ref. (M26, P11, In)

87-M. The Crystal Structures of Some Thorium Compounds. J. R. Murray. *Institute of Metals, Journal,* v. 84, Dec. 1955, p. 91-96.

Determination of the structures of four compounds in the thorium-aluminum system, one in the thorium-silver system and one in the thorium-gold system. Diagrams, tables. 13 ref. (M26, Th, Al, Ag, Au)

88-M. A Microbeam Back-Reflection X-Ray Camera. D. Lewis. *Journal of Scientific Instruments,* v. 32, Dec. 1955, p. 467-468.

A direct and accurate optical method of specimen location developed to be used with the camera. Exposure times were greatly reduced. Diagram, micrographs. 4 ref. (M22, Pt)

89-M. Dislocation Energies in NaCl. H. B. Huntington and J. E. Dickey. *Physical Review,* v. 100, ser. 2, Nov. 15, 1955, p. 1117-1128.

Energies for both screw and edge dislocations in rock salt have been investigated. The effect of elastic anisotropy has been incorporated into the contribution from the region outside the core. Detailed calculations have been carried out for the energies of the cores themselves as a function of radius, and joined smoothly to the curves of the elastic theory. The core calculations are based on the Born-Mayer model and employ the formulas of Madelung for the potentials of rows of uniformly spaced charges. Tables, diagrams. 18 ref. (M26)

90-M. Electrolytic Etching at Small-Angle Grain Boundaries in Germanium. S. G. Ellis. *Physical Review,* v. 100, ser. 2, Nov. 15, 1955, p. 1140-1141.

Difference of appearance between *n*-type and *p*-type germanium crystals, which have been anodically etched, can be explained if only the hole current contributes to the etching. An *n*-type crystal can be made to etch in the same way as a *p*-

type crystal if injected holes reach the crystal-electrolyte interface. Hole-electron recombination within the crystal can then reduce the rate of etching. Diagrams. 4 ref. (M21, Ge)

91-M. (English.) **Sub-Boundaries in Aluminium Single Crystals.** Koichi Nakajima and Tomiya Sutoki. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 7, no. 4, Aug. 1955, p. 344-350.

Investigates the splitting of Laue spots from the crystallographic point of view, apart from the lineage structure, and clarifies the effects of these controlling factors. Micrographs, tables, diagrams. 5 ref. (M26, Al)

92-M. (French.) **Preparation of Large Uranium Crystals by Change of Phase.** Pierre Lehr. *Comptes rendus,* v. 241, no. 16, Oct. 17, 1955, p. 1043-1044.

Method proposed for X-ray determination of crystal orientation and the degree of their perfection. 1 ref. (M26, U)

93-M. (French.) **Dilatometric Behavior of Alpha Uranium Monocrystals.** Pierre Lehr and Jean-Paul Langeron. *Comptes rendus,* v. 241, no. 17, Oct. 24, 1955, p. 1130-1133.

Dilatometric behavior as a function of orientation. Determination of the value of linear expansion coefficient according to the three main crystallographic axes. Graph, table. 2 ref. (M23, U)

94-M. (French.) **Determination of Transformation Points of Pure Iron.** Christian Boulanger. *Comptes rendus,* v. 241, no. 17, Oct. 24, 1955, p. 1133-1135.

Utilization of differential thermal analysis and evaluation according to the international thermometric scale of 1948. Pure iron is refined by treatment in vacuum. 1 ref. (M23, Fe)

95-M. (French.) **Influence of Small Amounts of Foreign Elements on the Structure of Cast Iron Pieces and on Their Cracking Tendencies.** Pierre Détrez and Jeanne Cuvillier. *Fonderie,* Nov. 1955, no. 118, p. 4771-4785.

Study of cracks occurring in the solid state during cooling, either after stripping or enameling. Tables, micrographs, graphs. 8 ref. (M27, Q26, CI)

96-M. (French.) **Influence of Gases on the Structure of Cast Iron.** Georges Blanc and Nicolas Volianik. *Fonderie,* no. 118, Nov. 1955, p. 4755-4770; disc., p. 4770.

Study of the effects of oxygen, hydrogen, and nitrogen on properties of cast iron after different treatments. Diagrams, photographs, micrographs, tables. 33 ref. (M27, CI)

97-M. (Norwegian.) **X-Ray and Magnetic Study of the System Cobalt Selenium.** Frithjof Bohm, Fredrik Gronvold, Haakon Haraldsen and Harald Prydz. *Acta Chemica Scandinavica,* v. 9, no 9, 1955, p. 1510-1522.

X-ray studies revealed three intermediate phases, namely, beta, gamma and delta phases. Composition, structure and properties of each phase, and magnetic properties of the compounds. Tables, graphs. 27 ref. (M24, P16, Co)

98-M. Notes From the Conference on Uranium Metallography at Battelle Memorial Institute on July 10, 1949. R. F. Dickerson. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* TID-5076, Feb. 1952, 19 p.

Participating laboratories polished, etched, examined and photographed specimens which were fabricated and heat treated by Battelle. The objectives of the conference were to compare and discuss preparation and interpretation of the metallographic specimens. Micrographs. (M general, U)

99-M. Penetration of Electrons and Ions in Aluminum. J. R. Young. *Journal of Applied Physics,* v. 27, Jan. 1956, p. 1-4.

Range and energy loss of low-energy electrons and light ions in aluminum. Diagram, graphs. 21 ref. (M25, Al)

100-M. Melting Patterns Appearing on Single Crystals of InSb. M. F. Millea and C. T. Tomizuka. *Journal of Applied Physics,* v. 27, Jan. 1956, p. 96-97.

Preliminary results of the melting process reveal significant features of crystalline imperfections. Photographs. 2 ref. (M26, N12, In, Sb)

101-M. The Structure of Electrodeposited Metals. Rolf Weil and Harold J. Read. *Metal Finishing,* v. 54, Jan. 1956, p. 56-59.

Surface structures found in electroplated metals deposited under a variety of conditions classified; development of structures from a polished basis metal studied. Theory proposed to account for formation of various structural types, based on consideration of lattice structure of plated metal and quantity of growth-impeding material in cathode film. Micrographs. (M27, L17, Zn, Cd)

102-M. Microstructure and Hardness Variation of Some Precious Metals During Vacuum Heating. M. G. Lozinskii and S. G. Fedotov. *Henry Brutcher Translation No.* 3594, 6 p.

(From *Izvestiya akademii nauk SSSR, OTN*, 1955, no. 5, p. 109-113.) Henry Brutcher, Altadena, Calif.

Hardness of the platinum group metals and their microstructures studied up to 1350° C. Table, graph, micrographs. 8 ref.
(M27, Q29, EG-c, Au, Ag)

103-M. (Dutch.) **Lattice Defects and Plastic Deformation of Metals. I. Type and Properties of Lattice Defects, in Particular, Dislocations.** H. G. van Bueren. *Metalen,* v. 11, no. 1, Jan. 15, 1956, p. 2-8.

Treats geometrical aspects of different dislocations and their behavior under shear stress, as shown by development of slip lines, work hardening, changes in electrical conductivity. Graph, diagrams, micrographs. 9 ref. (To be continued.)
(M26, Q24, P15)

104-M. (French.) **Electron Diffraction Study of Thin Layers of Titanium and Its Oxides.** Pierre Conjeaud. *Journal des recherches du centre national de la recherche scientifique,* 1955, no. 32, Sept., p. 273-290 + 4 plates.

Examination of thin layers, obtained by vacuum condensation of the vapor of alkaline halide monocrystals, shows three types of structures. The formation of different oxides and their reciprocal orientation. Diagrams, graphs, table. 19 ref. (M22, R2, Ti)

105-M. (German.) **Hexagonal Structure in Mono-Crystals. II. Deposition of Impurities in Metal Crystals Solidifying From the Melt.** F. Blaha. *Metall,* v. 9, nos. 23-24, Dec. 1955, p. 1077-1080.

Experiments and theoretical explanation of the phenomenon. Diagrams, graphs. 10 ref. (M26, N12)

106-M. (Russian.) **Influence of Surface-Active Medium on the Irregular Deformation of Zinc Single Crystal.** Iu. V. Goriunov, V. N. Rozhanskii and P. A. Rebinder. *Doklady akademii nauk SSSR,* v. 105, no. 3, Nov. 21, 1955, p. 448-450.

By decreasing surface tension, surface active substances facilitate the initiation of a new surface of dislocation. Graphs, photograph. 5 ref. (M26, N5, Zn)

107-M. (Russian.) **Use of the Electron Microscope in Studying the Development Mechanism of Temper Brittleness in Steel.** N. V. Kazakova and N. V. Koroleva. *Doklady akademii nauk SSSR,* v. 105, no. 6, Dec. 21, 1955, p. 1233-1235 + 1 plate.

Several variations of heat treatment to obtain temper brittleness in specimens for study. Grain boundaries show changes during processes of temper embrittlement and restoration of toughness. New phase appears with supplementary heating. Micrographs. 8 ref.
(M21, Q23, AY)

108-M. X-Ray Diffraction Effects to Be Expected From Irradiated Uranium. W. M. Cashin and C. W. Tucker, Jr. *Knolls Atomic Power Laboratory (U. S. Atomic Energy Commission),* KAPL-1158, Aug. 1954, 6 p.

Comparison of expected X-ray effects in irradiated uranium with effects in ionic, covalent and metallic crystals. Unique changes due to fission product formation. Table. 6 ref. (M22, M26, U)

109-M. Electron Emission From a Lattice Step on Clean Tungsten. J. K. Trolan, J. P. Barbour, E. E. Martin and W. P. Dyke. *Physical Review,* v. 100, ser. 2, Dec. 15, 1955, p. 1646-1649.

Proof that electron emission is observed from a surface irregularity of atomic dimension. Diagram, micrographs, table. 18 ref. (M26, W)

110-M. (English.) **Two-Center Integrals for Iron Using Wave Functions With Exchange.** M. Suffczynski. *Nuovo cimento,* v. 2, ser. 10, no. 6, Dec. 1955, p. 1320-1321.

Energy integrals for metallic body-centered iron computed by Wood's 3*d*1 function. 12 ref. (M25, Fe)

111-M. (German.) **Investigation of Binary Metallic Systems by Means of the Amalgam Method. System: Iron-Tin.** F. Lihl and H. Kirnbauer. *Monatshefte für Chemie,* v. 86, no. 6, 1955, p. 1031-1033.

Determination of proportions of the FeSn and $FeSn_2$ phases. Tables. 14 ref. (M24, Fe, Sn)

112-M. (German.) **Microscopic Observation of Dilation of Zinc Monocrystals.** Georg Masing and Klaus Schröder. *Zeitschrift für Metallkunde,* v. 46, no. 12, Dec. 1955, p. 860-866.

Studies of crystals with displacements in a favored sliding direction. Dislocations caused by bending stresses. Diagrams, micrographs. 15 ref. (M26, Q24, Zn)

113-M. (German.) **Crystallography.** Heinz Jagodzinski. Paper from "Handbook of Physics". v. VII. Pt. I. "Crystal Physics". Pt. I. Springer-Verlag, p. 1-103.

Crystal classes and space groups, symmetry and physical properties of homogeneous bodies, crystal geometry. Graphs, tables, diagrams. 47 ref. (M26, P general)

114-M. (German.) **Lattice Theory of Mechanical and Thermal Properties of**

Crystals. Günther Leibfried. Paper from "Handbook of Physics". v. VII. Pt. I. "Crystal Physics". Pt. I. Springer-Verlag, p. 104-324.

Lattice mechanics and thermodynamics, calculation of elastic data, crystal oscillations, heat conductivity mechanisms. Tables, graphs, diagrams. 106 ref. (M26, Q21, P11, P12)

115-M. (German.) **Theory of Lattice Defects.** Alfred Seeger. Paper from "Handbook of Physics". v. VII. Pt. I. "Crystal Physics". Pt. I. Springer-Verlag, p. 383-665.

Theory of lattice displacements, dislocations, radiation damages. Tables, diagrams, graphs. 198 ref. (M26)

116-M. (Book.) **Handbook of Physics.** S. Flugge, Ed. v. VII. Pt. I. "Crystal Physics". Pt. I. 687 p. 1955. Springer-Verlag, Berlin, Germany.

English and German papers covering crystallography. Lattice theory of the mechanical and thermal properties of crystals. Specific heat of solids. Theory of grid failures. (M26, P12)

117-M. (Book.) **Small-Angle Scattering of X-Rays.** André Guinier and Gérard Fournet. (Translated from the French by Christopher B. Walker.) Structure of Matter Series. 268 p. 1955. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. $7.50.

Theoretical and experimental data presented in complex form for the specialist. Uses and applications are presented in simple form for the nonspecialist, so that he may evaluate its use in his field. (M22)

118-M. (Book—Italian.) **Course in Metallography.** Leno Matteoli. 525 p. 1954. Associazione Italiana di Metallurgia Centro di Metallografia, Torino, Italy.

A complete and detailed study of metallography. (M general)

119-M. Foundry Practice. XI. Heat Treatment. William H. Salmon and Eric N. Simons. *Edgar Allen News,* v. 35, Jan. 1956, p. 14-15.

Examines the crystal structure following heat treatment and its effect on properties of steel castings. Graphs, micrographs. (To be continued.) (M26, J general, CI)

120-M. Color in Metallography. P. Levesque and R. Mroczek. *Educational Focus,* v. 26, Feb. 1956, p. 23-27.

Technique for producing consistently good color transparencies. Photographs, table. 4 ref. (M21)

121-M. The Lithium-Sodium Liquid Metal System. O. N. Salmon and D. H. Ahmann. *Journal of Physical Chemistry,* v. 60, Jan. 1956, p. 13-14.

By thermal and chemical analysis, critical temperatures and liquid phase compositions were determined. Graph, table. 7 ref. (M24, N12, Li, Na)

122-M. Radiation Damage in 99.0% Aluminum. J. L. Klein and W. B. Noak. *Massachusetts Institute of Technology (U. S. Atomic Energy Commission),* MIT-1091, 1952, 14 p.

Internal distortions in cold worked and irradiated 2S aluminum were measured by means of a Fourier analysis of X-ray line shapes; the Fourier coefficients are compared with those of an annealed specimen. Graphs, table. 3 ref. (M26, Al)

123-M. Diffracted-Beam Monochromatization Techniques in X-Ray Diffractometry. A. R. Lang. *Review of Scientific Instruments,* v. 27, Jan. 1956, p. 17-25.

Experimental arrangements and discussion of four methods, using curved-crystal focusing monochromators. Diagrams, graphs, photographs, table. 17 ref. (M22)

124-M. (German.) **The Effect of Electric Hot-Topping on the Interior of Heavy Forging Grade Steel Ingots.** Werner Martin and Erhard Thon. *Stahl und Eisen,* v. 75, no. 26, Dec. 29, 1955, p. 1765-1774.

Solidification of heated and unheated 18-ton ingots; effects of heating on segregation; mold design. Tables, graphs, diagrams, photographs. (M28, N12, D9, ST)

125-M. (Russian.) **Study of Intragranular Mosaic Structure of Austenite by Means of the Electron Microscope.** E. I. Kvashnina. *Metallovedenie i obrabotka metallov,* no. 5, Nov. 1955, p. 15-17.

Intragranular microstructure of quenched alloy steel has blocks differently oriented from those in zones along grain boundaries. Table, micrographs. 3 ref. (M26, N8, AY)

126-M. A Study of the Formvar Replica Process. A. W. Agar and R. S. M. Revell. *British Journal of Applied Physics,* v. 7, Jan. 1956, p. 17-25.

Shape of the cross section is examined under various conditions as plain replicas, shadowed replicas, and replicas shadowed on the back. Tables, micrographs, diagrams. 15 ref. (M21, CN)

127-M. The Automatic Recording of Electron Diffraction Patterns Applied to the Study of Evaporated Copper Layers. R. B. Kehoe, R. C. Newman and D. W. Pashley. *British Journal*

of Applied Physics, v. 7, Jan. 1956, p. 29-31.

Describes equipment for successively recording complete electron diffraction patterns after preset time intervals. Diagrams. 10 ref. (M22, L25, Cu)

128-M. Electrolytic Stream Etching of Germanium. Miles V. Sullivan and John H. Eigler. *Electrochemical Society, Journal,* v. 103, Feb. 1956, p. 132-134.

Technique for electrolytic etching in a controlled stream of 0.1% potassium hydroxide. A special jig renders masking operations unnecessary. Diagram, graphs, photographs. 6 ref. (M21, Ge)

129-M. Macroetching of Irradiated Uranium. G. R. Mallett *Hanford Atomic Products Operation (U. S. Atomic Energy Commission),* HW-39539, Oct. 1955, 6 p.

Electrochemical method, using a hydrochloric-phosphoric acid bath, has been developed which gives a good macro-etch on uranium irradiated up to 1550 MWD/AT. Photographs. 4 ref. (M21, U)

130-M. Plastic Laps for the Preparation of Specimens for Metallographic Examination. V. J. Haddrell, E. C. Sykes and B. W. Mott. *Institute of Metals, Journal,* v. 84, 1955-56, p. 112-114.

Polythene bonded laps can be used to prepare specimens without the need for the reactivation and trueing necessary when wax or lead are used, and are also suitable for attack-polishing when covered with Terylene fabric. Diagram, tables. 5 ref. (M21)

131-M. A Miscibility Gap in the Face-Centered Cubic Phase of the Copper-Nickel-Chromium System. J. L. Meijering, G. W. Rathenau, M. G. van der Steeg and P. B. Braun. *Institute of Metals, Journal,* v. 84, 1955-56, p. 118-120 + 1 plate.

Metallographic and X-ray diffraction study of the system with particular attention to the isothermal section at 930° C. Two face-centered cubic phases are shown to exist in addition to the body-centered cubic phase. Table, diagram, micrographs. 7 ref. (M24, Cu, Ni, Cr)

132-M. Sub-Structures in Ferrite. P. Samuel and A. G. Quarrell. *Iron and Steel Institute, Journal,* v. 182, Jan. 1956, p. 20-30.

Metallographic and X-ray studies on Armco iron and a number of pure iron-oxygen alloys of known oxygen and carbon contents after a variety of heat treatments. These treatments were chosen to reveal the conditions under which alpha-veining may be produced or eliminated and also to check some of the conflicting statements made in the literature. Micrographs, graph, table. 53 ref. (M26, Fe)

133-M. X-Ray Diffraction Study of the Nitrides of Uranium. D. A. Vaughan. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Feb. 1956, p. 78-79.

Study of the phases present in the region of the diffusion gradient on uranium reacted with nitrogen at several temperatures between 500 and 915° C. X-ray diffraction patterns. 3 ref. (M26, M22, U)

134-M. Electrolytic Polishing of Nodular Cast Iron. R. E. Skoda. *Metal Progress,* v. 69, Feb. 1956, p. 66.

Electropolishing of nodular cast iron in a solution of CrO_3, acetic acid and water is a rapid and easy method of preparing specimens for metallographic examination. Photographs, graph, micrographs. (M21, CI)

135-M. Grain Boundaries. I. Explanation of Microstructures in Terms of Energies. D. McLean. *Metal Treatment and Drop Forging,* v. 23, Jan. 1956, p. 3-10.

Considers the grain-boundary energies, shape of grains and microstructure of the metal which contribute to the explanation of strengthening or embrittling effects of boundaries. Graphs, diagrams, table. 17 ref. (M27)

136-M. Dislocation Densities in Some Annealed and Cold-Worked Metals From Measurements on the X-ray Debye-Scherrer Spectrum. G. K. Williamson and R. E. Smallman. *Philosophical Magazine,* v. 1, 8th ser., no. 1, Jan. 1956, p. 34-46.

Two basic equations are derived for deducing the dislocation density in powdered materials from the particle size and strain breadth measured from the Debye-Scherrer spectrum. Tables. 12 ref. (M26, H11, Cu, Al, W, Mo, Fe)

137-M. Antiferromagnetic Structure of Alpha-Manganese and a Magnetic Structure Study of Beta-Manganese. J. S. Kasper and B. W. Roberts. *Physical Review,* v. 101, ser. 2, Jan. 15, 1956, p. 537-544.

Neutron diffraction data have been obtained at 4.2 and 298° K. for both alpha-manganese and beta-manganese. The pattern of moment alignment in the antiferromagnetic state of alpha-manganese is deduced. Tables, graphs, diagrams. 10 ref. (M26, P16, Mn)

138-M. Angular Dependence of the Characteristic Energy Loss of Elec-

trons Passing Through Metal Foils. Richard A. Ferrell. *Physical Review,* v. 101, ser. 2, Jan. 15, 1956, p. 554-563.

The Bohm-Pines electron plasma theory is employed to give a theoretical interpretation of some previous experimental results on the scattering of 20-kev. electrons by a thin gold foil. Diagrams, graph, table. 21 ref. (M25, P15, Au)

139-M. Structure of the Intermediate State in Superconductors. A. L. Schawlow. *Physical Review,* v. 101, ser. 2, Jan. 15, 1956, p. 573-579.

A niobium powder method has been used to display the arrangement of normal and superconducting domains in the intermediate state of a superconductor. Patterns have been observed on samples of tin, indium, lead, vanadium and tantalum, and have been studied in some detail for tin. Diagrams, table, diffraction patterns, graphs. 16 ref. (M26, P15, Sn, In, Pb, V, Ta)

140-M. A Study of Ferrous Ternary Diagrams in Relation to Magnetic Interactions: The Fe-Ni-Al System. Ulrich Roesler. Paper from "Conference on Magnetism and Magnetic Materials". American Institute of Electrical Engineers, p. 89-91.

Thermodynamic analysis of the shape of the gamma loop in the iron-rich portion of the phase diagram. Graphs, diagrams. 3 ref. (M24, P16, Al, Fe, Ni)

141-M. The Electron Microscopy of Submicron Iron Particles. John H. L. Watson and Michael W. Freeman. Paper from "Conference on Magnetism and Magnetic Materials". American Institute of Electrical Engineers, p. 150-157.

Determination of shape and structure of colloidal alpha iron. Table, micrographs. 2 ref. (M21, H11, Fe)

142-M. (Czech.) **Constitution of Austenitic Mn-Cr and Cr-Ni Steels for High-Temperature Service.** Frantisek Poboril, Miroslav Knotek and Marcela Zezulova. *Hutnické listy,* v. 10, no. 12, Dec. 1955, p. 725-737.

Degree of embrittlement caused by sigma phase precipitation was determined on steels stabilized with tantalum, columbium, titanium or vanadium. The position of the examined steels in the respective ternary diagram was determined by means of derived equations for the calculation of equivalents of the principal alloying elements of both steel categories. Graphs, micrographs, tables. (M24, N7, Q23, AY)

143-M. (Russian.) **Autoradiographic Method, Utilizing Radioactive Isotopes, for Studying Metals and Alloys.** M. A. Studnits and O. T. Maliuchkov. *Metallovedenie i obrabotka metallov,* no. 6, Dec. 1955, p. 15-21.

Distribution of elements in alloys after crystallization, and redistribution after heat treatment. Mechanism of modification of cast iron and cast steel. Micrographs, diagrams. 4 ref. (M23, N8, CI)

144-M. Neutron Diffraction Studies of Hafnium-Hydrogen and Titanium-Hydrogen Systems. S. S. Sidhu, LeRoy Heaton and D. D. Zauberis. *Argonne National Laboratory (U. S. Atomic Energy Commission),* ANL-5501, Jan. 1956, 27 p.

Effect of metal-hydrogen bonds on the physical properties of hydrides, such as characteristic temperature and vibration frequency. Evidence and explanation for the embrittlement of metals by hydrogen. Tables, graphs, diagram. 15 ref. (M26, Q23, Hf, Ti)

145-M. System Zirconium-Nitrogen. R. F. Domagala, D. J. McPherson and M. Hansen. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Feb. 1956, p. 98-105.

Metallographic analysis of as-cast and annealed specimens of arc-melted alloys, plus a combined X-ray and analytical study of nitrided sponge, yielded the partial zirconium-nitrogen binary phase diagram. Graphs, micrographs, tables. 17 ref. (M24, Zr)

146-M. Thorium - Columbium and Thorium-Titanium Alloy Systems. O. N. Carlson, J. M. Dickinson, H. E. Lunt and H. A. Wilhelm. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Feb. 1956, p. 132-136.

On the basis of data obtained from microscopic examination, melting observations, cooling curves, X-ray analyses and resistance measurements, phase diagrams have been proposed for the two systems. Graphs, micrographs, table. 7 ref. (M24, Th, Ti, Cb)

147-M. High Speed Quenching Dilatometer. F. E. Martin and R. H. Raring. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Feb. 1956, p. 191-195.

Design and operation of instrument, useful in studying phase transformations in low alloy steels. An electrical micrometer tube is used to measure specimen length. Data for 0.11% and 0.67% C steels given. Micrographs, graphs, photograph, diagrams. 12 ref. (M23, N8, AY)

148-M. Occurrence of Chi Phase in a 16 Pct Cr, 15 Pct Ni, 7 Pct Mn, 6 Pct Mo Alloy. John Birtalan and R. A. Bloom. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Feb. 1956, p. 210-211.

Alloy was subjected to electrolytic separation treatment to obtain lattice parameter measurements of the chi phase. Spectrochemical analysis values given. 10 ref. (M26, Cr, Ni, Mn, Mo, Fe)

149-M. Titanium-Rich Corner of the Ti-Al-V System. J. J. Rausch, F. A. Crossley and H. D. Kessler. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Feb. 1956, p. 211-214.

The titanium-rich corner studied to determine phase relationships in the temperature interval 600 to 1200° C. Phase diagrams, graphs, table. 4 ref. (M24, Ti, Al, V)

150-M. Intermediate Phases in Binary Systems of Certain Transition Elements. Peter Greenfield and Paul A. Beck. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Feb. 1956, p. 265-276.

Thirty binary systems of vanadium and chromium group transition elements with second and third long period transition elements explored in regard to the intermediate phases formed. Tables. 47 ref. (M24, V, Cr)

151-M. Liquid Emulsion Autoradiography of Metals. Jack C. Bokros and Philip C. Rosenthal. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Feb. 1956, p. 286-288.

Autoradiographic technique used to study distribution of carbon-14 in pure iron after various treatments. Autoradiographs. 2 ref. (M23, Fe)

152-M. The Metallographic View. XIX. Metallography of Carburized Cases. H. E. Boyer. *Steel Processing,* v. 42, Feb. 1956, p. 100-101.

Structure studied at magnification of 50 x. Photograph, micrograph. (M27, J28, ST)

153-M. Collodion Replicas From Cross-Sections of Thin Metallic Strip and Coatings. D. J. Evans. *British Journal of Applied Physics,* v. 7, Feb. 1956, p. 64-65.

The use of collodion as a replica material for obtaining electron micrographs of cross-sections of thin metallic strip and coatings. Micrographs. 2 ref. (M21)

154-M. A Comparison of Dry Stripped, Unbacked Collodion and Formvar Replicas. D. J. Evans. *British Journal of Applied Physics,* v. 7, Feb. 1956, p. 66-67.

Comparison favors dry stripped plastic replicas for routine metallographic examinations. 5 ref. (M21)

155-M. The Chemical Polishing and Etching of Certain Nimonic Alloys for Metallurgical Examination. E. Meace. *Electroplating and Metal Finishing,* v. 9, Feb. 1956, p. 51-52.

Materials and procedures. Results are comparable with electromethods. Table, micrographs. (M21, Ni)

156-M. Use of Punched Card Machines for Computing Sums of Products. The Application to Electron Diffraction Calculations. Judith Bregman. *Journal of Chemical Physics,* v. 24, Feb. 1956, p. 405-407.

Procedure uses only those International Business Machines calculators which may be available in installations not set up primarily for scientific computation. Table. 3 ref. (M22)

157-M. The Temperature Calibration of a High Temperature X-Ray Diffraction Camera. J. A. Brand and H. J. Goldschmidt. *Journal of Scientific Instruments,* v. 33, Feb. 1956, p. 41-45.

Factors affecting calibration of the thermocouple, methods for calibration and for reducing the necessary temperature correction. Diagrams, graphs, table. 17 ref. (M22, S16)

158-M. Studies in the Chemistry of Etching. II. Some Observations on the Chemistry of the Etching Bath. J. I. M. Lewis and W. T. Engledew. *Process Engravers' Monthly,* v. 63, Feb. 1956, p. 55-57.

Brief discussion of copper etching experiments on relative acidity variation with time and loss of weight variation with time. Graphs. 5 ref. (M21, Cu, Fe)

159-M. Magnesium-Uranium Alloy System. George A. Tracy, P. Chiotti and H. A. Wilhelm. *Ames Laboratory (U. S. Atomic Energy Commission),* ISC-377, June 1953, 54 p.

Analytical, X-ray, thermal and metallographic data, and proposed phase diagram. Methods and apparatus suitable for preparation of reactive metals under inert atmosphere; crucible materials. Tables, micrographs, graphs, diagrams. 14 ref. (M24, Mg, U)

160-M. The Constitution Diagram of Molybdenum-Rich Uranium-Molyb-

denum Alloys. H. A. Saller, F. A. Rough and D. C. Bennett. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* BMI-730, Mar. 1952, 17 p.

Data on uranium-molybdenum alloys containing 50 to 100 at.% molybdenum indicate that about 1.8 at. 70% of uranium is soluble in molybdenum at 1200° C. Graph, micrographs, table. 4 ref. (M24, Mo, U)

161-M. An Examination of Verwey's Model for the Lattice Structure of the Free Surface of Alkali Halide Crystals. G. C. Benson, H. P. Schreiber and D. Patterson. *Canadian Journal of Physics,* v. 34, Mar. 1956, p. 265-275.

The Verway model used to estimate effect of surface distortion on surface energy of these crystals. Several aspects of the model were examined, including effect of various repulsive potentials and forms of distortion. Tables, diagram. 15 ref. (M26)

162-M. (Czech.) **The Metallography of Lead-Coated Steels and Some of Their Defects.** Josef Teindl and L. Bezecny. *Hutnické listy,* v. 11, no. 1, Jan. 1956, p. 18-21.

Defects appearing during the lead coating of sheet examined, suggestion is made to use, for certain cases, the method of lead plating with suitable electrolytes and the passivation of the coating. Diagrams, photographs, micrographs. (M27, L17, Pb, CN)

163-M. (Dutch.) **Lattice Defects and the Plastic Deformation of Metals. I. Type and Properties of Lattice Defects; Mechanical Model of a Dislocation.** H. G. van Bueren. *Metalen,* v. 11, no. 2, Jan. 31, 1956, p. 35-39.

Includes diagrams. 5 ref. (To be continued.) (M26, Q24)

164-M. (French.) **A New Method of Micrographic Examination of Uranium by Formation of Oxide Layers.** André Robillard, Janine Durand and Paul Lacombe. *Comptes rendus,* v. 242, no. 4, Jan. 23, 1956, p. 508-510.

A new method of electrolytic etching in which the reaction of alpha uranium with air forms oxide layers having different interference colors. Micrographs. 6 ref. (M21, U)

165-M. (French.) **Dilatometric Study of Heat Treatment of Copper Aluminums.** Pierre-Julien Le Thomas and Jeanne Cuvillier. *Fonderie,* 1956, no. 120, Jan. 1956, p. 28-32.

Study of treatment of copper aluminum by annealing and tempering; advantages of dilatometric method over micrographic method for investigation of properties. Graphs, phase diagram, micrographs. (M23, J general, Cu, Al)

166-M. (German.) **New Dilatometer and Its Application in Metallography.** Otto Werner. *Zeitschrift für Metallkunde,* v. 47, no. 1, Jan. 1956, p. 28-36.

An electronic device registers visibly the temperature or time dependence of length variations with magnification of 250 to 84,000. Graphs, diagrams, photographs. 35 ref. (M23)

167-M. (German.) **Structure of Crystalline Oxide Coatings on Monocrystalline Iron Layers.** Oswald Haase. *Zeitschrift für Naturforschung,* v. 11a, no. 1, Jan. 1956, p. 47-54 + 4 plates.

Preparation of iron single-crystal layers on preheated lithium fluoride surfaces in vacuum under different conditions. X-ray studies of surface structure. Diagrams, micrographs, graph, tables. 19 ref. (M26, Fe)

168-M. (Russian.) **Ternary and More Complex Solid Solutions of Metallic Compounds.** I. I. Kornilov. *Doklady Akademii Nauk SSSR,* v. 106, no. 3, Jan. 21, 1956, p. 476-478.

Conditions for the formation of continuous solid solutions, including similarity of crystal lattices and atomic similarity of the elements in the compounds. Diagram. 10 ref. (M24)

169-M. (Russian.) **Plotting the Boundaries of Limited Solubility in a Ternary System, by the Microhardness Method.** V. M. Glazov, M. V. Zakharov and M. V. Stepanova. *Izvestiia akademii nauk SSSR, otdelenie tekhnicheskikh nauk,* 1956, no. 1, Jan. 1956, p. 162-164.

Relation of temperature to solubility of chromium and zirconium, either separately or combined, in copper. Phase diagrams, tables. 5 ref. (M24, Cu, Cr, Zr)

170-M. (Russian.) **Influence of Crystallization Conditions on Macrostructure of Aluminum Alloys.** A. A. Popov. *Liteinoe Proizvodstvo,* 1956, no. 1, Jan. 1956, p. 23-25.

Macrostructure of alloys cast in a circular mold. Structure of moldings cast under conditions of controlled cooling. Diagrams, photographs. 2 ref. (M28, N12, Al)

171-M. (Spanish.) **Measurement of Diffused Radiation in Aluminum.** Jose Ors Martinez. *Instituto del hierro y del acero,* v. 8, no. 41, Oct.-Dec. 1955, p. 782-796.

Analytical study of the absorption of X-rays by homogeneous metallic materials, as well as by materials

having a lack of homogeneity in their structure, extending the study to the effect of diffused radiation in light metals, particularly aluminum. Graphs, diagrams, tables, photograph. 8 ref. (M22, Al)

172-M. (Russian.) **Phase Analysis of Titanium Alloys.** N. I. Blok, A. I. Glazova and N. F. Lashko. *Zavodskaia Laboratoriia,* v. 22, no. 1, 1956, p. 35-38.

Development of a method of electrolytic phase separation in titanium alloys by means of nonaqueous electrolytes. Titanium-chromium, titanium-chromium carbide, titanium carbide and titanium-chromium-aluminum carbide phases can be separated by this method. Tables. 5 ref. (M23, Ti, Cr, Al)

173-M. (English.) **Observation of Dislocations in Silver Halides. I. Annealed Crystals. II. Strained Crystals.** Hiroshi Kanzaki. *Physical Society of Japan, Journal,* v. 11, no. 2, Feb. 1956, p. 120-129.

Distribution of both the printed-out silver particles and the chemical etching pits was observed to determine dislocation patterns in annealed crystals of silver chloride and in strained crystals of silver bromide and chloride. Diagrams, micrographs. 14 ref. (M26, Ag)

174-M. (English.) **Electron Diffraction and Microscope Study of the Surface Structure of Copper Single Crystals.** Susumu Yoshida. *Physical Society of Japan, Journal,* v. 11, no. 2, Feb. 1956, p. 129-137.

Submicroscopic structure of electrolytically polished and etched crystal surfaces studied by means of electron diffraction and electron microscope, supplemented by the method of light figures. The etched surfaces are composed of submicroscopic facets which belong to (100) zone and the electropolished surfaces are smooth and undulating. Diagrams, graphs, micrographs, tables. 15 ref. (M26, Cu)

175-M. (French.) **Study of Geometric Imperfections in Metallic Monocrystals.** H. Lambot. *Revue Universelle des Mines,* v. 12, ser. 9, no. 2, Feb. 1956, p. 55-59.

Essential characteristics and application of an original X-ray diffraction method permitting the detection and precise measurement of geometrical imperfections in a metal grain. Diagram, X-ray photographs. 3 ref. (M26)

176-M. (German.) **Double-Etching as Determinant of Sulfidic Inclusions in Quality Iron Alloys.** Josefine Wallner. *Archiv für das Eisenhüttenwesen,* v. 27, no. 2, Feb. 1956, p. 101-102.

Etching according to M. Künkele's method, application of the method. Double etching by M. Künkele and P. Oberhoffer. Working procedure. Micrographs. 2 ref. (M21, ST)

177-M. (German.) **Aluminum Ingot Cast Texture and Its Significance.** Walter Roth and Margarete Schippers. *Zeitschrift für Metallkunde,* v. 47, no. 2, Feb. 1956, p. 78-85.

Structure of the cast ingots depends on the pouring technique and temperature changes during solidification. Diagrams, photographs, micrographs. 12 ref. (M28, N12, Al)

178-M. (Book.) **Solid State Physics.** Frederick Seitz and David Turnbull. v. I. 469 p. 1955. Academic Press Inc., 125 East 23rd Street, New York 10, N. Y. $10.00.

Comprehensive review of the important facets of solid-state science. (M general, N general, P general)

179-M. An Ultrasonic "Jack Hammer" for Removal of Inclusions. George L. Kehl, Hyman Steinmetz and Warren J. McGonnagle. *Argonne National Laboratory (U. S. Atomic Energy Commission),* ANL-5545, Mar. 1956, 12 p.

Mechanical method for removing inclusions of a minimum diameter of about 10 mu by means of a pointed stylus oscillating at ultrasonic frequencies. The method works well in removing hard and brittle secondary alloy phases and nonmetallic inclusions of either the hard, glassy type or the loose, fluffy kind. Diagram, micrographs, photographs. 7 ref. (M23, M27)

180-M. Method for the Study of Lattice Inhomogeneities Combining X-Ray Microscopy and Diffraction Analysis. S. Weissmann. *Journal of Applied Physics,* v. 27, Apr. 1956, p. 389-395.

Application of the method in establishing the coexistence of various orders of magnitude of substructural entities, in determining their size and disorientation, and in studying the nature of the small angle boundaries and mechanism of deformation. Diagrams. 9 ref. (M22)

181-M. Metallographic Identification of Nonmetallic Inclusions in Uranium. R. F. Dickerson, A. F. Gerds and D. A. Vaughan. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Apr. 1956, p. 456-460.

Metallographic identification of slag-type inclusions and of the uranium monocarbides, hydrides, dioxides, monoxides and mononitrides in uranium. Micrographs. 4 ref. (M general, U)

182-M. The Thermal Analysis of Zirconium-Tin Alloys. L. L. Wyman and J. F. Bradley. *Knolls Atomic Power Laboratory (U. S. Atomic Energy Commission),* KAPL-854, Dec. 1952, 9 p.

Several alloys of zirconium containing ½ to 5 wt. % tin studied by dilatometric and thermal analysis, with thermal effects generally confirming the previously proposed zirconium-tin diagram. Tables, graphs. 10 ref. (M23, M24, Zr, Sn)

183-M. The Structure of Solid Solutions. B. L. Averbach. *Massachusetts Institute of Technology Department of Metallurgy (U. S. Atomic Energy Commission),* NYO-7054, Nov. 1955, 36 p.

Sizes of atoms in solution, strain energy, strength, local atomic arrangements, changes in vibrational spectrum in alloy formation. Table, diagram, graphs. 23 ref. (M26, M25, Q23)

184-M. Microcracks in Case Hardened Steel. A. H. Rauch and W. R. Thurtle. *Metal Progress,* v. 69, Apr. 1956, p. 73-76.

Microcracks occur in high-carbon steels or cases, in number principally dependent on the grain size established by heat treatment, and independent of quenching rate, alloy content, or method of carburizing or carbonitriding. Graph, micrographs, tables. (M27, J28, ST)

185-M. Hexagonal Epsilion Phase in Vacuum-Melted 18% Chrome, 8% Nickel Steels. H. Krainer and E. Krainer. *Henry Brutcher Translation No.* 3668, 3 p. (From *Berg-und Hüttenmännische Monatshefte,* v. 100, no. 7-8, 1955, p. 247-248.) Henry Brutcher, Altadena, Calif.

Micrographic and X-ray structural analyses of 18-8 steel, water quenched from 2280° F. and cold reduced, indicate occurrence of epsilon phase and then of martensite. Table, graphs, micrographs. (M27, AY)

186-M. Etching of Metals in Gas Discharge (By Ionic Bombardment). I. I. Popenova and A. I. Frimer. *Henry Brutcher Translation No.* 3683, 8 p. (From *Zavodskaya Laboratoriya,* v. 21, no. 4, 1955, p. 432-436.) Henry Brutcher, Altadena, Calif.

By positive ion bombardment of the cathode specimen the weakly bonded matter is removed. Table, diagrams, micrographs. 3 ref. (M21)

187-M. (Czech.) Semi-Automatic Polishing of Metallographic Specimens From Very Hard Materials. Zdenek Ministr. *Hutnicke Listy,* v. 11, no. 3, Mar. 1956, p. 154-160.

Boron carbide and diamond dust are used. In a special holder, 48 specimens were polished in 50 min. Tables, graph, diagrams, photographs, micrographs. 16 ref. (M21, EG-d)

188-M. The "Sweeping-Beam" Method of X-Ray Analysis. F. Regler. *Engineers' Digest,* v. 17, Mar. 1956, p. 101-107. (From *Radex Rundschau,* no. 8, Dec. 1955, p. 664-683.)

The advantage of the sweeping-beam method with eccentrically rotated axes is that it increases the number of crystals investigated, without changing the interference patterns caused by the relative crystal orientation. Diagrams. (M22)

189-M. The Crystal Structure of Cr_5Si_3. Carol H. Dauben, D. H. Templeton and C. E. Myers. *Journal of Physical Chemistry,* v. 60, Apr. 1956, p. 443-445.

Observed and calculated structure factors; lattice dimensions of tetragonal crystals. Tables, diagrams. 10 ref. (M26, Si, Cr)

190-M. A Versatile X-Ray Diffractometer for Single-Crystal and Powder Studies. A. R. Lang. *Journal of Scientific Instruments,* v. 33, Apr. 1956, p. 138-141.

Mechanical design, accessories, recording methods. Photograph, diagrams. 11 ref. (M22)

191-M. The Identification and Distribution of Inclusions in Derby and Ingot Uranium. C. M. Schwartz and D. A. Vaughan. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* BMI-272, Aug. 1953, 25 p.

Inclusions identified by X-ray diffraction methods. Metallographic and microradiographic examinations show inclusions concentrated at the top of derby and ingot metal by gravity separation. Uranium carbide inclusions are distributed throughout the ingot metal; amount varies with the temperature maintained during remelt. Micrographs, tables. 4 ref. (M27, U)

192-M. Effect of Irradiation on the X-Ray Line Shape of 2S Aluminum From a Hanford Water Cooling Tube. J. L. Klein and W. B. Nowak. *Massachusetts Institute of Technology (U. S. Atomic Energy Commission),* MIT-1085, May 1952, 24 p.

Measurements of the internal distortions in cold worked and irradiated 2S aluminum made by means of a Fourier analysis of X-ray line shapes. Fourier coefficients yield quantitative values for the r.m.s. distortions produced by cold work and by cold work plus irradiation. Graphs. 3 ref. (M22, Al)

193-M. (Russian.) **Electronographic Determination of the Structure of $Tl_2Sb_2Se_4$.** Z. G. Pinsker, S. A. Semiletov and E. N. Belova. *Doklady Akademii Nauk SSSR,* v. 106, no. 6, Feb. 21, 1956, p. 1003-1006 + 1 plate.

Electron diffraction study of complex metallic layers. Electronograms obtained from sublimated layers of the pseudo-binary system T_2Se-Sb_2Se_3. Texture and orientation of crystallites. Micrograph, diagrams, photograph. 1 ref. (M26, Se, Tl, Sb)

194-M. (Russian.) **Investigation of Inclusions of the Oxide-Film Type in Aluminum Alloy Forgings.** I. N. Fridliander. *Doklady Akademii Nauk SSSR,* v. 107, no. 1, Mar.-Apr. 1956, p. 122-124.

Distribution of films and their microstructure, role of impurities, effect of sliding of layers during forging or pressing operations. Micrographs, table, diagram. (M27, F22, Al)

195-M. (Russian.) **Effect of Heating Rate on the Fine Structure of Chromium Steel.** I. N. Kidin. *Izvestiia Akademii Nauk SSSR, Otdelenie, Khimicheskikh Nauk,* 1956, no. 2, Feb. 1956, p. 26-34.

Effect of heating rate on size of coherent zones and hardness after quenching. Relation of temperature, heating rate and alloy composition to dimensions of mosaic blocks. Variation in size of austenitic formations along boundaries of coherent zones. Tables, graphs, diagram. 5 ref. (M26, M27, J general, Q29, AY)

196-M. (Russian.) **Crystals in Science and Technology.** A. V. Shubnikova. *Vestnik Akademii Nauk SSSR,* v. 26, no. 3, Mar. 1956, p. 37-52.

Main trends in the science of crystallography; relationship to other sciences. Types of crystal growth, methods of studying crystallographic phenomena. Photographs, micrographs. (M26)

197-M. (Spanish.) **Oxidation in Air of Iron Alloys Used as Metallographic Reagents.** Antonio Scortecci and C. Durand. *Instituto del Hierro y del Acero,* v. 9, no. 43, Feb. 1956, p. 169-175.

Color metallography of iron alloys consists of oxidation in air of metallographic specimens mechanically or electrolytically polished to remove the hard surface layer. Applications of the method to stainless steel, manganese steel, spheroidal cast iron and to the study of plastic deformations and recrystallization phenomena. Table. 42 ref. (M23, N5, R3, SS, AY, CI)

198-M. (Ukrainian.) **Structure of the Liquid Eutectic Bi-Pb Alloy in the Light of X-Ray Structural Analysis.** A. F. Skryshevs'kyi. *Dopovidi Akademii Nauk Ukrains'koi RSR,* 1956, no. 1, p. 62-66.

X-ray intensity curves show steric patterns of pure bismuth and pure lead. Graphs. 6 ref. (M26, Bi, Pb)

199-M. (Ukrainian.) **Crystal Structure of Ternary Compounds in Mn-Co-Si and Mn-Ni-Si Systems.** E. I. Gladyshevs'kyi, P. I. Kryp'iakevich and Iu. B. Kuz'ma. *Dopovidi Akademii Nauk Ukrains'koi RSR,* 1956, no. 1, p. 67-71.

X-ray and microstructural analysis of ternary compounds of the $MgZn_2$ structural type found in these systems. Isostructural properties of manganese and magnesium compounds. Tables. 12 ref. (M26, M27, Co, Si, Mg, Mn, Si)

200-M. A Model Metallographic Laboratory. II. S. J. Majka. *Canadian Metals,* v. 19, Apr. 1956, p. 56, 5 pages.

Design, layout and equipment of laboratory which will accommodate 25 workers without crowding or congestion in a floor space of 2500 sq. ft. Diagrams, photographs. (M general)

201-M. Investigations on the Microstructure of Uranium-Replication, Cathodic Vacuum Etching, and Optical and Electron Microscopy. T. K. Bierlein. *Hanford Atomic Products Operation (U. S. Atomic Energy Commission),* HW-34390, Jan. 1955, 35 p.

Various methods and techniques applicable to the study of fine microstructural details in radioactive specimens. Utility and quality of cathodic vacuum etching as a means for attaining a clean, etched surface demonstrated by micrographs of a variety of nonirradiated uranium specimens and their replicas. Diagrams, micrographs, photographs. 6 ref. (M21, M23, U)

202-M. The Equilibrium Diagram of the System Aluminium-Silicon. H. W. L. Phillips. *Institute of Metals, Annotated Equilibrium Diagrams, No.* 16, Nov. 1955, 3 p.

Includes numerical data and notes. Table, phase-diagram. 20 ref. (M24, Al, Si)

203-M. The Equilibrium Diagram of the System Aluminium-Beryllium. H. W. L. Phillips. *Institute of Metals, Annotated Equilibrium Diagrams, No.* 19, Feb. 1956, 4 p.

A large-scale diagram with accompanying table and notes. Tables, phase diagram. 8 ref. (M24, Al, Be)

204-M. The Equilibrium Diagram of the System Aluminium-Cobalt. H.

W. L. Phillips. *Institute of Metals, Annotated Equilibrium Diagrams, No.* 20, Feb. 1956, 5 p.

A large diagram of the system with auxiliary table and notes. Table, phase diagram. 12 ref. (M24, Al, Co)

205-M. The Equilibrium Diagram of the System Aluminium-Silver. H. W. L. Phillips. *Institute of Metals, Annotated Equilibrium Diagrams, No.* 21, Feb. 1956, 5 p.

Large diagrams of the system with accompanying tables and notes. Tables, phase diagrams. 20 ref. (M24, Ag, Al)

206-M. The Equilibrium Diagram of the System Aluminium-Titanium. H. W. L. Phillips. *Institute of Metals, Annotated Equilibrium Diagrams, No.* 22, Feb. 1956, 5 p.

A large diagram with table and notes. Table, phase-diagram. 6 ref. (M24, Al, Ti)

207-M. The Uranium-Mercury System. D. H. Ahmann, R. R. Baldwin and A. S. Wilson. *Iowa State College, Ames Laboratory (U. S. Atomic Energy Commission)*, CT-2960, Oct. 1945, 27 p.

The system has been studied by thermal analysis, vapor pressure-temperature curves and X-ray diffraction. There appears to be some solubility of uranium in mercury and of mercury in uranium but no mutual solubility between the compounds. Because of the pyrophoric nature of the amalgams, all work was done under vacuum or an inert atmosphere. Diagrams, graphs, tables. 16 ref. (M24, N12, U, Hg)

208-M. Intersection Faulting Mechanism Theory of Flow and Fracture of Face-Centered Cubic Metals. Robert B. Green. *Physical Review*, v. 102, ser. 2, Apr. 15, 1956, p. 376-380.

Intersection of any dislocation avalanche with a stationary dislocation having a Burgers vector component normal to the slip plane is shown to produce a close-packed partial plane of vacancies or interstitials in the slip plane and intrinsic or extrinsic faults for 111 slip planes. Explanation of preference for slip of 111 planes and X-ray evidence are given. Diagrams, graphs. 13 ref. (M26, Q24)

209-M. High-Temperature Microscopy. H. N. Baumann. Paper from "High-Temperature Technology". John Wiley & Sons. p. 484-490.

Construction and operation of a microscope assembly whose optical elements are designed for studies of high-temperature phenomena in the general range of 1500° C. and upwards. Micrographs, photographs. 6 ref. (M21)

210-M. High-Temperature X-Ray Diffraction. F. Schossberger. Paper from "High-Temperature Technology". John Wiley & Sons. p. 490-500.

Recent developments in the field, in terms of apparatus, techniques, applications. Diagrams, table. 74 ref. (M22)

211-M. (English.) **Electron-Diffraction Study of the Structure of Supercooled Liquid Bismuth.** Mieko Takagi. *Physical Society of Japan, Journal*, v. 11, no. 4, Apr. 1956, p. 396-405.

Thin bismuth films were prepared on crystal surfaces by evaporation and the liquid state of the films at temperatures above and below the ordinary melting point (271° C.) were studied by means of the reflection method of electron diffraction. Tables, graphs, diffractograms. 17 ref. (M26, M22, Bi)

212-M. (French.) **Study of Grain Boundaries and Substructures in Steels.** L. Habraken and P. Cuvelier. *Métaux, Corrosion-Industries*, v. 31, no. 367, Mar. 1956, p. 105-125.

Electron metallographic study in pure iron, carbon steel and alloy steels. Examination of growth during interrupted isothermal and anisothermal treatments. Influence of annealing and high-temperature creep tests. Diagrams, micrographs. 12 ref. (M27, J general, Q3, Fe, ST)

213-M. (German.) **Production and Hardening of Cobalt-Nickel-Zinc Alloys.** Werner Köster, Heinz Schmid and Ezatollah Dahesh. *Zeitschrift für Metallkunde*, v. 47, no. 3, Mar. 1956, p. 165-171.

The phase diagram of sintered cobalt-nickel-zinc alloys (containing 15 to 60% zinc) is set up by means of microscopic, X-ray and magnetic investigations. The alloys show magnetic and mechanical age hardening. Diagrams, tables, micrographs, graphs. 9 ref. (M24, N7, Co, Ni, Zn)

214-M. (German.) **Auxiliary Means for Metallographic Work and Demonstration.** Roland Mitsche. *Zeitschrift für Metallkunde*, v. 47, no. 3, Mar. 1956, p. 171-175.

Equipment and attachments which will facilitate metallographic investigation including a binocular eyepiece with indicator, micrometer eyepiece for determining grain size, and magnetic microscope stage. Photographs, diagrams. 3 ref. (M21)

215-M. (German.) **Application of Radioactive Methods to Metallographic**

Problems (Autoradiography). G. Glawitsch. *Zeitschrift für Metallkunde,* v. 47, no. 3, Mar. 1956, p. 199-202.

Owing to the high velocity of α and β-particles during nuclear disintegration, as well as the nature of the γ-radiation, the method of autoradiography produces a blackening of the reproductive photographic material which is not exactly confined to the spot of the source of radiation. This reduction in resolving power may be balanced successfully by the transfer printing method. Diagrams, graph, autoradiographs. 12 ref. (M23)

216-M. (Russian.) **Ultraviolet Metallographic Microscope.** T. G. Porokhova. *Zavodskaia Laboratoriia,* v. 22, no. 3, Mar. 1956, p. 336-340 plus 1 plate.

Optical arrangement of microscope, types of screens and light filters, method of using the apparatus, contrast between micrographs with this and the usual microscopes. Micrographs, photographs, tables, diagram, graph. (M21, Ni, Al, Zn, Pb-h)

217-M. (Russian.) **Separation of Cementite From Titanium Carbide.** N. M. Popova and M. F. Rybina. *Zavodskaia Laboratoriia,* v. 22, no. 3, Mar. 1956, p. 274-275.

Method includes selective solution of one of the phases to a mixture of carbides containing cementite and titanium carbide. Tables. 2 ref. (M23, Ti, ST)

218-M. (Book-German.) **Theoretical Metallography.** Ulrich Dehlinger. 250 p. 1955. Springer-Verlag, Berlin; Göttingen, Heidelberg.

Crystallographic fundamentals; electronic and crystal structure in the periodic system. Heat of composition and lattice structure of alloys. Physical properties of elements and alloys. Phase equilibrium and reaction kinetics.
(M general, N general, P general)

219-M. Grain Size Chart of Uranium. H. A. Saller, R. F. Dickerson and G. E. Lind. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* BMI-66, June 1951, 14 p.

Specimens of each desired grain size were prepared and photographed using both polarized light and bright field illumination. Table, micrographs. (M27, U)

220-M. Autoradiographic Methods in Powder Metallurgy. G. F. Huettig and G. Glawitsch. *Powder Metallurgy Bulletin,* v. 7, Apr. 1956, p. 108-112.

Characteristics of autoradiographic pictures; availability of isotopes; resolving power of radiographs; sensitivity of the autoradiographic procedure. Diagrams, micrographs, table, autoradiographs. 5 ref. (M23, H general)

221-M. Contribution to the Problem of Bonding in Solids. H. Nowotny and H. Reichel. *Powder Metallurgy Bulletin,* v. 7, Apr. 1956, p. 130-133.

Effect of chemical bonding on X-ray spectra was used to determine the bonding character in different alloys. X-ray emission as well as absorption spectra can serve for this purpose. Photograph, table. 7 ref. (M26)

222-M. Structures and Structural Relations of Refractory Metallic Compounds. Erwin Parthe. *Powder Metallurgy Bulletin,* v. 7, Apr. 1956, p. 138-145.

Study of the structures of refractory hard metals with the aim of supplying general laws and structural relationships which should permit the prediction of new high-melting compounds in systems so far not investigated and which should thereby indicate direction of future research work. Graphs, diagram, table. 11 ref. (M26, EG-d)

223-M. A New Ternary Boride: Cr_4NiB_2. Benjamin Post, Egon Pipitz and William H. Herz. *Powder Metallurgy Bulletin,* v. 7, Apr. 1956, p. 149-152.

Systematic investigation of the system Cr-Ni-B. Several compositions between M_3B_4 and MB_2, and close to M_3B_4, were studied. Tables. 2 ref. (M26, H general, B)

224-M. An Electron Diffraction Examination of Thin Films of Aluminium and Gold Prepared by Vacuum Evaporation. T. B. Rymer. *Royal Society, Proceedings,* v. 235, ser. A, Apr. 24, 1956, p. 274-288.

Results were interpreted by assuming the crystals to be large and to contain a sessile dislocation. Observations provide an interesting example of a dislocation arising during the growth of a crystal being revealed by diffraction experiments. Diagrams, graphs, tables. 8 ref. (M26, N16, Al, Au)

225-M. Dislocation in Crystalline Solids. N. F. Mott. Paper from "Surveys in Mechanics". Cambridge University Press. p. 32-63 + 5 plates.

A general survey of what has been achieved by the study of dislocations. Micrographs, graphs, diagrams. 66 ref. (M26)

226-M. (French.) **Dislocations and Plastic Properties of a Solid.** J.

Philibert. *Métaux, Corrosion-Industries,* v. 31, no. 368, Apr. 1956, p. 153-166.

Theoretical elastic limit, whiskers, brittle fracture, movement of dislocations, strain aging and formation of Cottrell clouds. Graphs, micrographs, tables, diagrams. 19 ref. (M26, Q21, Q23)

227-M. (French.) **Construction and Improvement of a Precision Chamber for Making High-Temperature X-Ray Diagrams.** René Diament. *Métaux, Corrosion-Industries,* v. 31, no. 368, Apr. 1956, p. 167-187.

Improved apparatus for studying refractory alloys, minimizing temperature adjustment and increasing precision in determining crystallographic constants. Diagrams, photograph, micrograph, graphs, tables, x-ray diagrams. 14 ref. (M22)

228-M. (German.) **Some Suggestions for Application of the Electron Microscope in Metallography.** E. Brüche and H. Poppa. *Metall,* v. 10, Nos. 9-10, May 1956, p. 415-419.

Methods of application, grain boundary in microfield, slip bands, desintegration (working) planes, roughness determination. Diagram, micrographs. 1 ref. (M21, M27, Q24, S15)

229-M. (German.) **Electronic Theoretical Investigations of Defects in Metals. II. Association Energy of Vacancy Couples (Lattice) in Monovalent Metals and in Transition Metals.** Alfred Seeger and Helmut Bross. *Zeitschrift für Physik,* v. 145, no. 2, 1956, p. 161-183.

Calculating method. Ellipsoidal potential as well as a model for double lattice holes in metal. Friedel's condition. Numerical results. Tables, graph, diagrams. 33 ref. (M26)

230-M. (Russian.) **Some Data on the Equilibrium Diagram of the Chromium-Niobium System.** V. P. Eliutin and V. F. Funke. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* no. 3, Mar. 1956, p. 68-76. + 2 plates.

Research data on chromium-niobium alloys. A liquidus and a solidus line are plotted on the equilibrium diagram of the chromium-niobium system. Tables, graphs, micrographs, phase diagram. 4 ref. (M24, Cr, Cb)

231-M. (Russian.) **Study of a Copper-Chromium-Zirconium Phase Diagram.** M. V. Zakharov, M. V. Stepanova and V. M. Glazov. *Metallovedenie i Obrabotka Metallov,* no. 3, Mar. 1956, p. 23-27 + 2 plates.

Temperature and shift of binary and ternary phase boundaries. Relation between temperature and solubility of chromium and zirconium in copper. Microstructural analyses. Table, phase diagrams. 12 ref. (M24, Cu, Cr, Zr)

232-M. (Russian.) **Structure of Superconductors. IX. X-Ray Determination of the Structure of α-Bi_3Rh.** V. P. Glagoleva and G. S. Zhdanov. *Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki,* v. 30, no. 2, Feb. 1956, p. 248-251.

Structure of low-temperature modification. Lattice peculiarities, position of bismuth and rhodium atoms, interatomic distances and electronic density series. Diagrams, tables. 4 ref. (M26)

233-M. (Russian.) **Reaction of Salts With Metals in the Fused State. Interaction in the System $PbCl_2$-Mg-$MgCl_2$+Pb.** A. P. Palkin and V. T. Redchenko. *Zhurnal Neorganicheskoi Khimii,* v. 1, no. 1, Jan. 1956, p. 133-144.

Ternary system phase diagrams, crystallization temperatures, substitution reactions. Diagrams, graphs, tables, phase diagrams. 17 ref. (M24, Pb, Mg)

234-M. (Russian.) **Study of the Ternary Phase Diagram of the Ni-Ni_3Nb-Ni_3Ta System.** I. I. Kornilov and E. N. Pylaeva. *Zhurnal Neorganicheskoi Khimii,* v. 1, no. 2, Feb. 1956, p. 308-316 + 1 plate.

Thermal and chemical analysis of alloys of the system. Fusibility diagram. Solubility limit of the solid solution of niobium and tantalum in nickel. Graphs, tables, micrographs, phase diagram. 7 ref. (M24, Ni, Cb, Ta)

235-M. Temper Embrittlement of Steel Studied Under Electron Microscope. N. V. Kazakova and N. V. Koroleva. *Henry Brutcher Translation No.* 3702, 5 p. (From *Doklady Akademii Nauk SSSR,* v. 105, no. 6, 1955, p. 1233-1235.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 107-M, 1956. (M21, Q23, AY)

236-M. (English.) **The Structure of Oxide Films on Different Faces of a Single Crystal of Copper.** Kenneth R. Lawless and Allan T. Gwathmey. *Acta Metallurgica,* v. 4, no. 2, Mar. 1956, p. 153-163.

Composition and structure of oxide films formed on electropolished single crystals studied for eight different crystal faces, using X-ray

diffraction techniques. Diagrams, tables, graphs. 16 ref. (M26, Cu)

237-M. (English.) **Structural Relationships Between Intermetallic Compounds.** P. J. Black. *Acta Metallurgica,* v. 4, no. 2, Mar. 1956, p. 172-179.

Structural features of aluminum-rich transition metal compounds correlated and classified. Tables, diagrams. 43 ref. (M26, Al)

238-M. (English.) **Physical Evidence of Dislocations in Chromium.** M. J. Fraser, D. Caplan and A. A. Burr. *Acta Metallurgica,* v. 4, no. 2, Mar. 1956, p. 186-196.

Chromium sheet, thermally etched at 1300 and 1500° C. in purified hydrogen, was found to exhibit a number of surface structures which are conceived as resulting from the presence of dislocations. Micrographs. 36 ref. (M26, Cr)

239-M. (English.) **On the Coupled Dislocations Along a Grain Boundary.** Yasutada Uemura. *Physical Society of Japan, Journal,* v. 11, no. 5, May 1956, p. 479-484.

By analyzing interesting patterns of the etch-pits due to coupled dislocations along a grain boundary in germanium crystals, direct and quantitative verification of the law of interaction between edge dislocations is obtained. Diagrams, tables, graphs, micrographs. 5 ref. (M26)

240-M. (English.) **Electron Microscopic Study on the Structure of Mosaic Boundaries in Ni-Mn Single Crystal.** Tadami Taoka and Shoichiro Aoyagi. *Physical Society of Japan, Journal,* v. 11, no. 5, May, 1956, p. 522-527.

The mosaic boundary is composed of a set of parallel edge dislocations which are regularly spaced on some crystal lattice planes and are stable in the crystal. Table, graph, diagram, micrographs. 11 ref. (M26, Ni, Mn)

241-M. (English.) **Equilibrium of Solid Phases in Cu-Mn Binary System.** Masayuki Kawasaki, Kenkichi Yamaji and Osamu Izumi. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 7, no. 5, Oct. 1955, p. 443-454.

Equilibrium investigated by observing changes in various physical properties, especially in high-manganese alloys. Micrographs, graphs. (M24, P general, Cu, Mn)

242-M. (German.) **Theory of Noble Metals.** K. Ladanyi. *Acta Physica Academiae Scientiarum Hungaricae,* v. 5, no. 4, 1956, p. 361-380.

Investigation of bonds between noble metals on basis of statistical theory developed by Gombas. Calculated data are in concordance with experimental results. Tables, graphs. 8 ref. (M general)

243-M. (German.) **Physics of Crystals.** Z. Gyulai. *Acta Physica Academiae Scientiarum Hungaricae,* v. 5, no. 4, 1956, p. 425-443.

New phenomena of plastic deformation of crystals. Plastic and elastic deformations of $Na_2S_2O_3$ crystals. Rotation phenomers in their solution. Diagrams, photographs, graphs, micrographs, ultra-violet spectra. 10 ref. (M26, Q24)

244-M. (German.) **Determination of Structural Variations in Cast Iron by Means of Color Photography.** Gabrielle Aubrion. *Giesserei,* v. 43, no. 9, Apr. 26, 1956, p. 203-210.

Application of common and special etching compounds, use of cold and hot etchants, solving practical structural problems and detection of defective material. Micrographs. 8 ref. (M21)

245-M. (German.) **Application of Radio-Isotopes in the Science of Materials.** K. Sauerwein. *Metall,* v. 10, nos. 9-10, May 1956, p. 387-393.

Irradiation methods, radiography, use of tagged atoms in metallurgy. Tables, diagram, photographs, radiographs. 8 ref. (M23, S19)

246-M. (German.) **Electron Spectrograph for Physical Investigation of Metal.** Walter Dietrich, Heinrich Dükker and Gottfried Möllenstedt. *Zeitschrift für Metallkunde,* v. 47, no. 4, Apr. 1956, p. 240-242.

An electrostatic analyzer of high resolving power suitable for investigating the velocity spectrum of 50-kv. electrons. Graph, photographs, diagram, spectrograms. 14 ref. (M22)

247-M. (German.) **Contribution to Formation of Systems Vanadium-Silicon and Columbium-Silicon.** Richard Kieffer, Friedrich Benesovsky and Hans Schmid. *Zeitschrift für Metallkunde,* v. 47, no. 4, Apr. 1956, p. 247-253.

Alloys are made by sintering under pressure, by converting powdery mixtures into solid material with the aid of argon, and by melting the metals in electric arc furnaces. These silicides are not very hard and are not scale-resistant. Tables, micrographs, phase diagrams. 31 ref. (M24, H general, C21, V, Si, Cb)

248-M. (German.) **Determination of Particle Sizes and Lattice Deformation**

by Means of X-Ray Interference. Viktor Hauk and Christoph Hummel. *Zeitschrift für Metallkunde,* v. 47, no. 4, Apr. 1956, p. 254-260.

Influence of cold pressing of cast iron and steel on particle size and lattice distortions of ferrite crystals investigated by measuring X-ray interferences with a goniometer combined with a Geiger counter. Tables, graphs. 36 ref. (M22, M26, CI, ST)

249-M. The Constitution Diagram of Uranium-Rich Uranium-Molybdenum Alloys. H. A. Saller, F. A. Rough and D. A. Vaughan. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* BMI-72, June 1951, 31 p.

Gamma uranium forms by a peritectic reaction from liquid and delta phases at about 1285° C. and 42 at. % molybdenum. Its solubility decreases with decreased temperature to 28 to 30% at 575 to 600° C., when it transforms to an intermetallic phase, designated as "epsilon". Diagram, tables, micrographs, graphs. 8 ref. (M24, U, Mo)

250-M. Phase Relations in the Uranium-Zirconium-Oxygen Systems Involving Zirconium and Uranium Dioxide. Henry A. Saller, Frank A. Rough, Joseph M. Fackelmann, Arthur A. Bauer and J. Robert Doig. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* BMI-1023, July 1955, 30 p.

A portion of the system, including uranium dioxide and zirconium and related phase regions, was studied at 1000, 1300 and 2000° F. Tentative isothermal sections were established for each of these temperatures. Diagrams, micrographs, tables. 5 ref. (M24, Zr, U)

251-M. The Constitution of the Titanium-Tin System in the Region 0-25 Atomic Per Cent. Tin. M. K. McQuillan. *Institute of Metals, Journal,* v. 84, Apr. 1956, p. 307-312.

Below about 1050° C. the diffusion rate in titanium-tin alloys is exceptionally slow; equilibrium cannot be achieved in most alloys below 900° C., even after many months of heating. Tables, graphs. 17 ref. (M24, N1, Ti, Sn)

252-M. The Constitutional Diagram of the System Chromium-Beryllium From 0 to 70 Atomic Per Cent Beryllium. A. R. Edwards and S. T. M. Johnstone. *Institute of Metals, Journal,* v. 84, Apr. 1956, p. 313-317.

Diagram was investigated by thermal analysis, X-ray diffraction and metallographic methods, and found to comprise a eutectic system between the chromium-rich solid solution and an intermediate phase based on $CrBe_2$. Table, graphs, diagrams. 15 ref. (M24, Cr, Be)

253-M. Low Temperature Dilatometry of Uranium. Henry L. Laquer and Adam F. Schuch. *Los Alamos Scientific Laboratory (U. S. Atomic Energy Commission),* LAMS-1358, Jan. 1952, 14 p.

A study of the length changes of uranium with temperature, in the interval from room temperature to that of boiling hydrogen, discloses that uranium has a negative expansion coefficient and perhaps a phase change between 20 and 50° K. Tables, graphs. 6 ref. (M23, P11, U)

254-M. Some Empirical-Theoretical Considerations of Uranium Nitride in Zirconium. Bernard Kopelman. *U. S. Atomic Energy Commission, Research and Development Report,* SEP-32, Dec. 1949, 17 p.

Reactions of zirconium and uranium, examination of prepared samples, tests applied as proof of the absence of uranium in the zirconium matrix. Micrographs. (M27, U, Zr)

255-M. Some Aspects of the Metallography of Stainless Steel and Stainless Steel Weldments. G. V. Smith. *Welding Journal,* v. 35, May 1956, p. 456-462.

Differentiation of the several microconstituents of stainless steels can generally be accomplished with certainty, provided that several etchants are used in turn. Graphs, micrographs, photograph, tables, diagrams. 13 ref. (M27, SS)

256-M. (English.) **The Electronic Structures Around Impurities in Monovalent Metals.** Shozo Shinohara. *Hokkaido University, Faculty of Science, Journal,* ser. 2, v. 4, Dec. 1955, p. 337-390.

Behavior of electrons in binary alloys which form solid solutions, heat of formation of alloys in disordered state, heat of solution of hydrogen in copper, work functions of alloys. Diagrams, graphs, tables. 11 ref. (M25, P12, P15)

257-M. (French.) **Application of the Cathodic Oscillograph to the Recording of Temperature-Time Curves During Quick-Hardening of Metals.** Roland Bigot and René Faivre. *Revue de Métallurgie,* v. 53, no. 2, Feb. 1956, p. 131-138.

Apparatus used to study quantitatively the cooling kinetics of a nickel cylinder during its hardening and to show the importance and the

diversity of calefaction phenomena in liquids decomposable or not by heat. Graphs, diagrams. 20 ref. (M23, N general, Ni)

258-M. (French.) **A Metallographic Study of Cold Working on Heat Resisting 80-20 Nickel-Chromium Alloys.** Ch. Bückle and J. Poulignier. *Revue de Métallurgie,* v. 53, no. 3, Mar. 1956, p. 179-188.

Metallurgical results of the alloy's use at high temperature. Superficial alterations due to skin-annealing treatment. Micrographs. 4 ref. (M27, Q24, Ni)

259-M. (Russian.) **Casting Titanium Film Replicas for Electron-Microscopic Examination of the Structure of Welded Joints.** Iu. B. Malevskii and G. F. Darovskii. *Avtomaticheskaia Svarka,* v. 9, no. 2, Mar.-Apr. 1956, p. 22-26.

A new method of separating film replicas from the specimen which provides clean films free of adherent particles. Discusses the use of 99.6 % pure titanium films for casting replicas of the surface of welded joints. Micrographs, diagram, diffractograms. 7 ref. (M21, Ti)

260-M. (Russian.) **Study of the Aluminum-Tantalum Phase Diagram.** V. M. Glazov, M. V. Mal'tsev and Iu. D. Chistiakov. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* no. 4, Apr. 1956, p. 131-136.

Thermal, chemical and X-ray analyses. Macro and microstructure of alloys. Relation of solubility of tantalum in aluminum to temperature. Peritectic reaction at 668-669° C. Tables, graphs, micrographs, phase diagrams. 2 ref. (M24, Al, Ta)

261-M. (Spanish.) **The Atomic Structure of the Actinides.** German E. Villar. *Ciencia y Tecnologia,* v. 5, no. 19, Oct.-Dec. 1955, p. 174-179.

Electronic configuration of the actinides and the law of formation of electronic configurations according to the most recent information. Tables. 12 ref. (M25, EG-h)

262-M. The Equilibrium Diagram of the System Antimony-Tin. E. C. Ellwood. *Institute of Metals, Annotated Equilibrium Diagrams,* No. 23, Apr. 1956, 5 p.

The most probable composite diagram is given along with numerical data. Table, diagram. 16 ref. (M24, Sb, Sn)

263-M. The Lattice Spacings of Nickel-Copper and Palladium-Silver Alloys. B. R. Coles. *Institute of Metals, Journal,* v. 84, May 1956, p. 346-348.

Total changes in spacing (at room temperature) discussed in terms of theories of the contributions of the *d*-bands to the cohesion. Graphs, tables. 12 ref. (M26, Ni, Cu, Pd, Ag)

264-M. A Note on the Plotting of Accurate Large-Scale Stereographic Projections. J. W. Christian. *Institute of Metals, Journal,* v. 84, May 1956, p. 349-350.

Projections of crystallographic planes may be readily plotted in terms of linear co-ordinates with a minimum of calculation. Diagram. 5 ref. (M23)

265-M. Surface Examination by Reflection Electron Microscopy. J. S. Halliday. *Institution of Mechanical Engineers, Proceedings,* v. 169, no. 38, 1955, p. 777-781 + 4 plates; disc., p. 782-787 + 6 plates.

Method is particularly suitable for examination of surfaces on which irregularities are small. Micrographs of various metals show that ground surfaces of comparable roughness may have different textures and these differences appear to be related to mechanical properties. Tables, micrographs, photographs, diagrams. 14 ref. (M21)

266-M. Covergent-Beam X-Ray Analysis of Mosaic Structure in Polycrystals. Chester R. Berry. *Journal of Applied Physics,* v. 27, June 1956, p. 636-639.

A simple X-ray diffraction method was used to measure mosaic misalignment and number of dislocations in grains of silver halide precipitates and of nickel foils where grain sizes were in the range from a few tenths of a micron to a few microns. Photographs, table, diagram. 11 ref. (M22, M26, Ni)

267-M. Substructures in Retained-Beta Phase of Ti-Ni Alloys. D. H. Polonis and J. Gordon Parr. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, May 1956, p. 514-515.

Microstructures of 100% β phase in a quenched 6 at. % nickel alloy were examined. Micrographs. (M27, Ti, Ni)

268-M. High Temperature X-Ray Diffraction Investigation of the Zr-H System. D. A. Vaughan and J. R. Bridge. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, May 1956, p. 528-531.

The phase diagram over the range 0 to 65 at. % was determined by high-temperature X-ray diffraction

methods. Results show a eutectoid between α-zirconium and the hydride phase. Tables, graphs. 6 ref. (M26, M22, M24, Zr)

269-M. Magnesium-Uranium System. P. Chiotti, G. A. Tracy and H. A. Wilhelm. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, May 1956, p. 562-567.

A summary of analytical, X-ray, thermal and metallographic data. No intermetallic compounds are formed by these two elements, and their mutual solubility is limited at temperatures up to 1255° C. Tables, micrographs, diagrams. 9 ref. (M24, Mg, U)

270-M. Re-Examination of Ti-Fe and Ti-Fe-O Phase Relations. Elmars Ence and Harold Margolin. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, May 1956, p. 572-577.

Re-examination points to the existence of Ti_2Fe, which forms by peritectoid reaction between β and TiFe in the vicinity of 1000° C., and indicates the presence of two ternary phases, γ and ε. Diagrams, micrographs, tables. 16 ref. (M24, Fe, Ti)

271-M. Cubic Texture in Ultrathin Tapes of 48 Pct Ni-Fe Alloy. Martin F. Littman. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, May 1956, p. 593-595.

Orientations and magnetic properties determined. Table, stereograms. 3 ref. (M26, P16, Ni, Fe)

272-M. Titanium-Molybdenum-Oxygen System. Paul A. Farrar, Louis P. Stone and Harold Margolin. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, May 1956, p. 595-600.

Alloy preparation, homogenization and heat treatment, metallography, X-ray diffraction, melting points, phase diagram delineation. Tables, diagrams, graphs, micrographs. 19 ref. (M24, Ti, Mo)

273-M. Contribution to the Bi-Mn System. A. U. Seybolt, H. Hansen, B. W. Roberts and P. Yurcisin. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, May 1956, p. 606-610.

The bismuth-manganese phase diagram in the region near BiMn was investigated, using principally thermal analysis and changes in magnetization with temperature. Micrographs, graphs, tables, diagram. 8 ref. (M24, Bi, Mn)

274-M. The Crystal Structure of Gamma Plutonium. W. H. Zachariasen. *Los Alamos Scientific Laboratory (U. S. Atomic Energy Commission),* LA-1325, Sept. 1951. 11 p.

Gamma plutonium is found to be orthorhombic with eight atoms in a unit cell of dimensions (at 226° C.) $a_1 = 3.1518$ kX, $a_2 = 5.7568$ kX, $a_3 = 10.142$ kX. Tables, photographs. 3 ref. (M26, Pu)

275-M. X-Rays and Heat Treating. Roy W. Drier. *Metal Treating,* v. 7, May-June 1956, p. 12, 14.

X-ray diffractometry is an excellent analyzer of heat treatment factors. Diffractograms. (M22, J general)

276-M. (English.) **Dislocation Arrays and Rows of Etch-Pits.** B. A. Bilby and A. R. Entwisle. *Acta Metallurgica,* v. 4, no. 3, May 1956, p. 257-261.

Arrangement of pits in α-brass was found to be consistent with the assumption that each corresponds to an individual dislocation. Arrangement is correlated with that predicted for linear groups of dislocations piled up under shear stress. Graph, table, micrographs. 7 ref. (M26, Cu)

277-M. (English.) **Low-Frequency Studies of Dislocation Interactions With Solute Atoms.** S. Weinig and E. S. Machlin. *Acta Metallurgica,* v. 4, no. 3, May 1956, p. 262-267.

Internal friction of 99.999% copper and copper binary alloys investigated at 40° C. in a high-vacuum torsion pendulum at a 1 c.p.s. frequency of vibration. The effects of solute additions of 0.01 to 1 at.% aluminum, nickel and silicon were studied. Graphs, tables. 9 ref. (M26, Q22, Cu)

278-M. (English.) **A Study of (112) Edge Dislocations in Bent Silicon-Iron Single Crystals.** W. R. Hibbard Jr., and C. G. Dunn. *Acta Metallurgica,* v. 4, no. 3, May 1956, p. 306-315.

Cancellation of unlike dislocations was observed in detail during removal of a polygonization structure and also during removal of a cold worked structure. The change in distribution of edge dislocations after bending and annealing was investigated. Table, diagrams, graphs, micrographs. 19 ref. (M26, Fe)

279-M. (English.) **Dislocations at Compositional Fluctuations in Germa-**

nium-Silicon Alloys. A. J. Goss, K. E. Benson and W. G. Pfann. *Acta Metallurgica,* v. 4, no. 2, May 1956, p. 332-333.

Spacing and alignment of etch-pits examined. Micrographs. 5 ref. (M26, Si, Ge)

280-M. (German.) **Screw Dislocation and Evaporation of Metal Single Crystals in Electron Microscope.** Michael Drechsler. *Zeitschrift für Metallkunde,* v. 47, no. 5, May 1956, p. 305-308.

Mechanism of evaporation, number, orientation and displacement of screw dislocations. Photograph, graph, table, diagram, micrographs. 11 ref. (M26)

281-M. (German.) **Decomposition of Crystal Surface During Evaporation and Its Relation to the Structure of Grain Boundaries.** Erwin Votava. *Zeitschrift für Metallkunde,* v. 47, no. 5, May 1956, p. 309-311.

In an investigation of sodium chloride crystals, characteristic edge structures were found along low-angle grain boundaries, for which only screw dislocations can be responsible. Diagrams, micrographs. 14 ref. (M26)

282-M. Direct Carbon Replicas From Metal Surfaces. E. Smith and J. Nutting. *British Journal of Applied Physics,* v. 7, June 1956, p. 214-217.

Methods for removal of carbon replica films directly evaporated on to etched metal surfaces involve either electropolishing or chemically etching after deposition of the carbon. (M21)

283-M. The Chromium-Rich Alloys of the Chromium-Titanium-Tungsten System at 900 and 1200° C. N. Ryan. *Commonwealth of Australia, Dept. of Supply, Aeronautical Research Laboratories Report No.* Met. 13, July 1955, 13 p. + 1 plate.

Metallographic and X-ray methods used to study 900 and 1200° C. isotherms of the chromium-titanium-tungsten system. Phase boundaries determined. (M24, W, Ti, Cr)

284-M. Ingot Structure. *Iron and Steel Institute, Journal,* v. 29, June 1956, p. 239-243.

Effect of casting temperature and pouring speed on structure and segregation in steel ingots. (M28, N12, D9, ST)

285-M. Moving Dislocations and Solute Atoms. Gunther Schoeck. *Physical Review,* v. 102, ser. 2, June 15, 1956, p. 1458-1459.

In the stress field of a moving dislocation, stress-induced local rearrangement of solute atoms takes place. From this rearrangement there results a friction force, which depends on the velocity of the dislocation. (M26, Q25)

286-M. The Lattice Spacings of Thin Electrodeposits of Cobalt and Nickel on a Copper Single Crystal. R. C. Newman. *Physical Society, Proceedings,* v. 69, no. 436B, Apr. 1956, p. 432-440.

Electron diffraction investigation shows that deposits have their normal lattice spacings. (M26, M22, L17, Co, Ni, Cu)

287-M. (German.) **Measurement of Temperature Rise in Specimens by Means of Electron Interference.** Albert Winkelmann. *Zeitschrift für Angewandte Physik,* v. 8, no. 5, May 1956, p. 218-221.

Measurement of temperature increase of gold-copper foil with 75 atomic % copper under electronic radiation is possible by comparing diffractograms. (M22, S16, Au, Cu)

288-M. (Russian.) **Distortions of the Crystal Lattice of Coarse and Fine-Grained Steel by Cold Plastic Deformation.** V. M. Finkel'. *Fizika Metallov i Metallovedenie,* v. 2, no. 1, 1956, p. 189-191.

Relation of intensity of lines to degree of deformation. Effect of texture. (M26, Q24)

289-M. (Slovak.) **Electrolytic Polishing of Metals for Metallographic Investigation.** Ivan Hrivnak. *Zvaranie,* v. 5, no. 2, Feb. 2, 1956, p. 46-48.

Techniques of electrolytic polishing in preparing specimens for microstructural studies, preparation of the electrolytes, equipment used. (M21, M27, L13, Ni, Cr, CN, ST, AY)

290-M. The Nature of the Film Formed on Copper During Electropolishing. E. C. Williams and Marjorie A. Barrett. *Electrochemical Society, Journal,* v. 103, July 1956, p. 363-366.

Film formed during electropolishing in orthophosphoric acid was found, by electron diffraction methods, to be composed of a phosphate of copper. Phenomenon seems to signify attainment of a solubility limit. (M26, L13, Cu)

291-M. (Czech.) **Advances in Metallographic Microscopy.** Ladislav Jenicek. *Hutnik,* v. 6, no. 1, Jan. 1956, p. 1-9 + 4 plates.

Review of progress in metallographic microscopy and macroscopy. Study of fractures, domain struc-

ture, phases, inclusions and impurities, and transformations. (M21, M23, S13, N8)

292-M. (French.) **Central Diffusion of X-Ray by Metals.** Jean Blin. *Publications scientifique et techniques du ministere de l'air,* 1956, no. 311, 97 p.

Study of the diffusion of rays by deformed metallic crystals and the variation of this diffusion as a function of the degree of cold-hardening of the metal. (M22, N1, N7)

293-M. (German.) **Amount and Types of Oxide Inclusions in Chromium-Manganese Case-Hardening Steels From the Time of Melting in Basic Openhearth Furnaces to Solidification.** Erwin Plöckinger. *Stahl und Eisen,* v. 76, no. 13, June 28, 1956, p. 810-824. (M27, D2, ST)

294-M. (Hungarian.) **Metallographic Examination of Large Dross Inclusions Occurring in Steels.** Zoltan Hegedüs *Kohaszati Lapok,* v. 9, no. 4, Apr. 1956, p. 165-172.

Origin of and causes for large inclusions; examination by microscope and etching; determination of the origin of the inclusion from its structure. (M general, ST)

295-M. (Japanese.) **Method for Revealing the Austenite Grain Size in Steel.** Chiaki Asada and Ryo Kadowaki. *Iron & Steel Institute of Japan, Journal,* v. 42, no. 6, June 1956, p. 476-481.

New method for identifying grain boundaries utilizes special polishing and proper etching techniques for specimens hardened and tempered to the brittle sorbitic structure. (M21, N8, ST)

296-M. (Russian.) **A Rapid Method for Examining the Primary Structure of Welded Joints.** A. A. Rossochinskii. *Zavodskaia Laboratoriia,* v. 22, no. 5, May 1956, p. 558-560.

Method for treatment of polished microsections of specimens in two different solutions, securing a better exposure of the structure of primary crystallization. (M21, K1, M27)

297-M. Vibratory Polishing of Metallographic Specimens. F. M. Krill. *Metal Progress,* v. 70, July 1956, p. 81-82.

A new method of polishing aluminum alloys with vibrating equipment has reduced the labor and skill required and increased the quality. (M21, Al)

298-M. An Emission Electron Microscope for Research at High Temperatures. G. Baas and G. W. Rathenau. *Philips Technical Review,* v. 18, June 1956, p. 1-10.

Construction and use of microscope having a resolving power of about 1000° A. and an adjustable magnification of up to 3000 X. (M21)

299-M. (French.) **Influence of the Microstructure of Steel on the Cold Working Coefficient *n* Determined During Tensile Testing in the Interval $E_{0.01}$ and $E_{0.2}$. Possible Relation of This Coefficient With Adaptation Phenomena.** Georges Delbart and Fernand Maratray. *Comptes Rendus,* v. 242, no. 23, June 4, 1956, p. 2718-2720.

Shows that the above coefficient varies with the microstructure. (M27, Q27, ST)

300-M. (German.) **Solid Solutions in the System ZnS-MnS, ZnSe-MnSe, and ZnTe-MnTe.** Robert Juza, Albrecht Rabenau and Gertrud Pascher. *Zeitschrift für anorganische und Allgemeine Chemie,* v. 285, no. 1-2, May 1956, p. 61-69.

Experimental investigation included determinations of solubility, conductivity, crystal structure, molecular volume and coordination number. (M24)

301-M. (German.) **Investigation of the Theory of Energy State of Electrons in Ideal and Disordered Crystal Lattices.** Folker Engelmann. *Zeitschrift für Physik,* v. 145, no. 4, 1956, p. 430.450.

Three-dimensional treatment of the above problem based on a simplified potential process. Dependence of Electron energy on the degree of lattice disorder. (M26)

302-M. (German.) **Liquidus Curve and Critical Point of the Aluminum-Zinc System.** A. Munster and K. Sagel. *Zeitschrift für Physik Alische Chemie (Frankfurt),* v. 7, no. 5-6, 1956, p. 296-316.

Construction of the phase diagram by measurements of electrical conductivity. (M24, P15, Al, Zn)

303-M. A Practical System for Preparing Metallographic Specimens. Roy L. Anderson. *AB Metal Digest,* v. 2, July 1956, p. 3-5.

A tried and proven method. (M21)

304-M. Direct Observation of Defects in Crystal Lattices. *Engineer,* v. 202, July 6, 1956, p. 6.

Electron microscope shows dislocations in platinum phthalocyanine crystals. (M26)

305-M. Metallographic Identification and Crystal Symmetry of Titanium

Hydride. L. D. Jaffe. *Journal of Metals,* v. 8, *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, July 1956, p. 861.

Titanium hydride showed strong optical anisotropy when examined under polarized light. Its structure is probably tetragonal. (M26, Ti)

306-M. Autoradiography in the Study of Surface Phenomena. B. Verkerk. *Nucleonics,* v. 14, July 1956, p. 60-64.

Technique used for making surface autoradiographs of metal specimens. (M23)

307-M. Atomic Mobility in a Cu-Al Alloy After Quenching and Neutron Irradiation. Chi Yao Li and A. S. Nowick. *Physical Review,* v. 103, ser. 2, July 15, 1956, p. 294-303.

A study of atomic mobility in a Cu-Al (17 at. % Al) solid solution was carried out by anelastic relaxation methods. (M25, Q22, J26, Cu, Al)

308-M. Effect of Core Excitation on the Hyperfine Structure of Rubidium. Melba Phillips. *Physical Review,* v. 103, ser. 2, July 15, 1956, p. 322-323.

Perturbations of the ratio of hyperfine coupling constants for the $5P$ levels of rubidium were investigated. (M25, Rb)

309-M. Gamma Transitions in Ta^{181}. F. Boehm and P. Marmier. *Physical Review,* v. 103, ser. 2, July 15, 1956, p. 342-343.

The nuclear spectrum of Ta^{181}. (M25, Ta)

310-M. The Direct Study by Electron Microscopy of Crystal Lattices and Their Imperfections. J. W. Menter. *Royal Society, Proceedings,* v. 236, ser. A, July 10, 1956, p. 119-135 + 7 plates.

Studies on thin crystals of copper and platium phthalocyanine in the transmission electron microscope. (M26, Cu, Pt)

311-M. The Metallographic View. Metallography of Carburized Cases. XXIV. Refinement Afforded by Double Treatment. H. E. Boyer. *Steel Processing,* v. 42, July 1956, p. 396, 414.

Photomicrographs show degree of refinement which can be effected by quenching, reheating and requenching process.
(M27, J28, J26, ST)

312-M. Evaluating Titanium Alloys by X-Ray Diffraction. *Western Metals,* v. 14, July 1956, p. 67-68.

Studies have led to suppression of undesirable metal phases and enhancement of beneficial structures. (M22, M26, Ti)

313-M. (English.) **On the Properties of Binary Mixtures. II. A Method for Testing the Assumption of Compound Formation.** Erik Högfeldt. *Receuil des Travaux Chimiques des Pays-Bas,* v. 75, no. 6, June 1956, p. 790-795.

Positive and negative deviations from ideal behavior in binary mixtures in relation to the formation of compounds with a stoichiometric composition A_uB_v. Results are applied to metallic phases.
(M24, Bi, Tl, Hg, Pb, Cd)

314-M. (French.) **Cinemicrography in Metallurgy.** A. Kerleroux and R. Foin. *Métaux, Corrosion-Industries,* v. 31, no. 370, June 1956, p. 289-294.

Methods and equipment used. An experiment in following the structural changes of a stainless steel sample between 20 and 900° C. using color film. Method furnishes valuable information about the speed at which phenomena proceed. (M23, N8, SS)

315-M. (French.) **Effect of Temperature and Pouring Speed on Ingot Structure.** *Revue de Métallurgie,* v. 53, no. 6, June 1956, p. 471-481.

Examination of ingot surfaces revealed transverse cracks in the ingot cast rapidly at a higher temperature, while that cast more slowly at a lower temperature exhibited a slaggy surface. (M28, D9, ST)

316-M. (German.) **The Copper-Silver-Cadmium System. I.** Erich Gebhardt and Günter Petzow. *Zeitschrift für Metallkunde,* v. 47, no. 6, June 1956, p. 401-411.

Structure investigated by thermal analysis, microhardness determination, X-ray examination, and dilatometrical measurements.
(M24, Cu, Ag, Cd)

317-M. (German.) **Structure and Phases in the Copper-Tellurium System.** Ingeborg Patzak. *Zeitschrift für Metallkunde,* v. 47, no. 6, June 1956, p. 418-420.

The phases Cu_2Te, Cu_7Te_5, and CuTe examined by X-ray.
(M24, Cu, Te)

318-M. (German.) **The Three-Element System Copper-Lead-Tellurium.** Horst Gravemann and Hans-Joachim Wallbaum. *Zeitschrift für Metallkunde,* v. 47, no. 6, June 1956, p. 433-441.

Phase equilibria investigated by thermal analysis and microscopic examination. (M24, Cu, Pb, Te)

319-M. (Polish.) **Criterion of Existence of an Intermetallic Compound in Binary Systems.** Aleksander Krupkowski. *Archiwum Hutnictwa,* v. 1, no. 1, 1956, p. 3-9.

Thermodynamic considerations. (M24)

320-M. (Russian.) **On the Structure of the "White Zone".** L. S. Palatnik, I. M. Liubarskii and B. T. Boiko. *Fizika Metallov i Metallovedenie,* v. 2, no. 2, 1956, p. 285-293 + 1 plate.

The metallographic method, microhardness tests, radiographic examination and chemical analysis used to study structure of the so-called white zone in the surface layers of the teeth of case-hardened cog wheels. (M27, J28, ST)

321-M. (Russian.) **On Reliefs Formed by Twin-Crystal Interlayers on Cleavage Planes of Bismuth, Antimony and Zinc.** V. I. Startsev and V. M. Kosevich. *Fizika Metallov i Metallovedenie,* v. 2, no. 2, 1956, p. 320-327.

An interferometric and radiographic study of microreliefs of cleavage planes of metallic crystals deformed by twinning. Deflection angles of the cleavage plane both in the twin and in the abutting regions are calculated and measured. (M27, M26, Bi, Sb, Zn)

322-M. (Russian.) **A Study of Alloys of the Gold-Cobalt System.** A. T. Grogor'ev, E. M. Sokolovskaia and M. V. Maksimova. *Zhurnal Neorganicheskoi Khimii,* v. 1, no. 5, 1956, p. 1047-1051.

Thermal analysis of the system, determination of microstructure, hardness and electric resistance. Gold with cobalt has a simple diagram with a eutectic at 10% cobalt, eutectic temperature of 995° C., and a limited solubility of components in the solid state. (M24, Co, Au)

323-M. (Russian.) **A Study of the Palladium-Gold-Cobalt System.** A. T. Grigor'ev, E. M. Sokolovskaia, L. D. Budennaia, I. A. Iiutina and M. V. Maksimova. *Zhurnal Neogranicheskoi Khimii,* v. 1, no. 5, 1956, p. 1052-1063.

Investigation by thermal analysis, determination of hardness and microstructure after annealing and hardening at various temperatures, specific resistance and its temperature coefficient. Palladium increases the mutual solubility of gold and cobalt to a considerable extent. (M24, Co, Au, Pd)

324-M. (Russian.) **A Study of the Copper-Cobalt System.** A. T. Grigor'ev, L. A. Panteleimonov, L. M. Viting and V. V. Kuprina. *Zhurnal Neorganicheskoi Khimii,* v. 1, no. 5, 1956, p. 1064-1066 + 1 plate.

An improved phase diagram plotted on the basis of thermal analysis and data on microstructure and hardness. The system shows no discontinuity in solubility in the liquid state. (M24, Cu, Co)

325-M. (Russian.) **A Study of the Palladium-Copper-Cobalt System.** A. T. Grigor'ev, L. A. Panteleimonov, V. V. Kuprina and L. I. Rybakova. *Zhurnal Neorganicheskoi Khimii,* v. 1, no. 5, 1956, p. 1067-1073 + 1 plate.

Thermal analysis, determination of microstructure after annealing, Brinell hardness, and specific resistance and its temperature coefficient. Mutual solubility of copper and cobalt increases with increasing palladium content. (M24, Pd, Cu, Co)

326-M. The Metallographic Structure of Cast 11-14% Chromium Steels. Arne Faerden. *Metallurgia,* v. 54, no. 321, July 1956, p. 3-10.

The steels were first studied in the as-cast and in the tempered conditions, and then the austenitic structure was developed by thermal etching in high vacuum. (M27, SS)

327-M. The Effects of Radiation on Solids. Frederick Seitz and Eugene P. Wigner. *Scientific American,* v. 195, Aug. 1956, p. 76 + 5 pages.

The orderly atomic arrangement characteristic of metals and other crystals determines many of their properties. Energetic radiation disturbs the order and thus can drastically alter the properties. (M26)

328-M. Dislocations in Face-Centered Cubic Lattices. N. Thompson. Paper from "Defects in Crystalline Solids". Physical Society, p. 153-158.

Considers limitations imposed by the geometry of the crystal lattice on the nature and configuration of dislocations in a face-centered cubic lattice, with particular reference to the form and properties of 'jogs' in dislocation lines. (M26)

329-M. An Experimental Study of Dislocations in Aluminium—Copper Alloys by Means of Precipitation. H. Wilsdorf and D. Kuhlmann-Wilsdorf. Paper from "Defects in Crystalline Solids". Physical Society, p. 175-186.

Results of an electron microscope investigation into preferred precipitation in slip lines and dislocations in aluminium with betwen 1.2 and 4.8% copper. (M26, N7, Al)

330-M. The Influence of Dislocations and Impurities on the Distribution and Size of Etch-Figures on Pure Aluminium. G. Wyon and P. Lacombe. Paper from "Defects in Crystalline Solids". Physical Society, p. 187-196.

It is probable that associations of dislocations and impurity atoms are necessary for the formation of etch-figures, but it must be assumed that etching is due to the presence of impurity atoms in more or less condensed atmospheres. (M26, Al)

331-M. Stored Energy and Lattice Defects in Cold-Worked Metals. W. Boas. Paper from "Defects in Crystalline Solids". Physical Society, p. 212-221.

Measurements of changes in internal energy, electrical resistivity, density and hardness which occur during annealing of copper and nickel deformed at room temperature indicate that almost all the energy stored in copper is due to dislocations, but vacancies make a significant contribution to that stored in nickel. (M26, P12, Cu, Ni)

332-M. Stacking Faults in Close-Packed Lattices. A. Seeger. Paper from "Defects in Crystalline Solids". Physical Society, p. 328-339.

From considerations of the electronic structures it is concluded that monovalent metals and cobalt should have low stacking fault energies whereas Al, Mg, Zn, Cd, Ni, Pd, Pt should have high stacking fault energies. (M26)

333-M. Small Angle Scattering of X-Rays by Cold-Worked Metal. J. Blin. Paper from "Defects in Crystalline Solids". Physical Society, p. 420-422.

Intensity of scattered rays is used to study the defects created in metals by plastic deformation. (M22, M26, Q24)

334-M. (English.) **On the Electron Diffraction Patterns From the Oriented Silver Films.** Yasuyoshi Watanabe. *Physical Society of Japan, Journal,* v. 11, no. 7, July 1956, p. 740-747.

Intensity distribution was calculated and compared with calculated intensities by assuming that the silver film was composed of the parallel-growth structures, the twin structures and the structures having defects. (M26, L25, Ag)

335-M. (English.) **Anomalous Enhancement of X-Ray Reflection Intensity at the Boundary of Ground and Etched Regions on Crystal Surface.** Norio Kato. *Physical Society of Japan, Journal,* v. 11, no. 7, July 1956, p. 748-754.

The anomalous enhancement is due to a reduction of primary extinction caused by elastic distortion accumulated at the boundary region. (M22, M26)

336-M. (French.) **Gases and Inclusions in Steel. II. Oxygen in Steel.** P. Tyou. *Industrie Chimique Belge,* v. 21, no. 6, June-July 1956, p. 579-592.

Analytical procedures and apparatus. (M27, D9, S11, ST)

337-M. (Book.) **Theory of Alloy Phases.** 378 p. 1956. American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. $5.00.

Twelve papers on such subjects as the band theory of bonding in metals, X-ray spectroscopy of solids, crystal structure and atomic size, structure of solid solutions, and alloy phase diagrams. (M general)

338-M. Electron Microscopy: Its Scope and Limitations. V. E. Cosslett. *Endeavour,* v. 15, July 1956, p. 153-165.

The instrument, applications in biology, medicine, metallurgy and solid-state physics and practical limitations. (M21)

339-M. X-Ray Study of Lattice Vibrations in Aluminum. C. B. Walker. *Physical Review,* v. 103, ser. 2, Aug. 1, 1956, p. 547-557.

The diffuse scattering of monochromatic X-rays by a single crystal of aluminum at 300° K. was measured along seven lines in reciprocal space. (M26, M22, Al)

340-M. The Intensity of Emission of Characteristic X-Radiation. C. R. Worthington and S. G. Tomlin. *Physical Society, Proceedings,* v. 69, no. 437 A, May 1956, p. 401-412.

A method for calculating emission intensity from thick targets as a function of the target atomic number, accelerating voltage, and angle of emission was applied to emission from silver, copper, chromium and aluminum. (M22, Ag, Cu, Cr, Al)

341-M. The Phase Sections at 500 and 350° C. of Aluminum-Rich Aluminium-Copper-Lithium Alloys. H. K. Hardy and J. M. Silcock. *Institute of Metals, Journal,* v. 84, July 1956, p. 423-428 + 2 plates.

Phase relationships of three ternary intermetallic compounds. (M24, Al, Cu, Li)

342-M. A Recording Camera for Metallography With Polarized Light. B. R. Butcher and I. A. McDonald. *Institute of Metals, Journal,* v. 84, July 1956, p. 453-454 + 1 plate.

Design and operation of camera. (M21)

343-M. Research on Phase Relationships in Ternary Metal-Metal-Oxygen Systems. *Armour Research Foundation, Illinois Institute of Technology, Progress Report No.* B-090G1, for

Wright Air Development Center, Wright-Patterson Air Force Base, Contract No. AF 33(616)-3195, July 1956, 25 p.

Lattice constant composition curves were completed for Fe_3O_4-$FeAl_2O_4$ and rhombohedral Fe_2O_3-Al_2O_3 solid solutions. The existence of the compound $Fe_2O_3.Al_2O_3$ was confirmed, its interplanar spacings are listed, and its low temperature stability boundary was fixed at between 1270 and 1300° C. (M24, Fe, Al)

344-M. Methods of Etching High-Alloy Chromium and Chromium-Nickel Steels for Austenite, Ferrite, Sigma Phase, & Carbide. F. Braumann and G. Pier. *Henry Brutcher, Translation No.* 3763, 15 p. (Abridged from *Archiv für das Eisenhüttenwesen,* v. 26, no. 3, 1955, p. 145-151.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 156-M, 1955. (M21, AY)

345-M. New Etch Spots Leaded Steels. A. E. Gerds and C. W. Melton. *Iron Age,* v. 178, Aug. 30, 1956, p. 86-87.

Using relatively simple reagents, this etching technique lends a consistent identifying color to leaded microconstituents. Essential as a research tool, it may also prove valuable in sorting mixed stock. (M21, S10, ST)

346-M. Orientation Relationships Between Alpha Prime and Beta Phases in a Ti-Ni Alloy. D. H. Polonis and J. Gordon Parr. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, sec. 2, Aug. 1956, p. 892-893.

Investigates habit planes of the martensitic phase as well as the orientation relationships between martensitic and parent phases. (M26, Ti, Ni)

347-M. Investigation of the Partial Constitution Diagram Ti-$TiAu_2$. Paul Pietrokowsky, Ellis P. Frink and Pol Duwez. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, sec. 2, Aug. 1956, p. 930-935.

Titanium-gold alloys in the region of composition extending from titanium to $TiAu_2$ studied metallographically. (M24, Ti, Au)

348-M. Dislocations in Plastically Bent Germanium Crystals. F. L. Vogel, Jr., *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, sec. 2, Aug. 1956, p. 946-949.

Densities and distributions of dislocations in plastically bent germanium crystals before and after annealing. (M26, Ge)

349-M. Microstructure of Iron-Sulfur Alloys. Alfred S. Keh and Lawrence H. Van Vlack. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, sec. 2, Aug. 1956, p. 950-958.

The effect of heat treatments and of additions of manganese, aluminum, silicon and oxygen upon the distribution of sulphide inclusions in iron. (M27, Fe)

350-M. Beta Phase Parameters in the System Ti-V-Mo. Jack L. Taylor. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, sec. 2, Aug. 1956, p. 959-961.

As expected from similar crystal structures and favorable atomic size factors, titanium, vanadium and molybdenum are completely soluble in one another above the transformation temperature of titanium. The β phase parameters of the continuous solid solution are shown graphically. Limiting compositions for retained β phase determined. (M24, Ti, V, Mo)

351-M. Beta Chromium. Ernest P. Abrahamson, II, and Nicholas J. Grant. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, sec. 2, Aug. 1956, p. 975-977.

Investigates the structure of β-chromium with both X-ray back-reflection cameras and spectrometers. (M26, Cr)

352-M. Etch Pits and Dislocations in Zinc Monocrystals. John J. Gilman. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, sec. 2, Aug. 1956, p. 998-1004.

Technique for producing etch pits at the sites of edge dislocations in zinc monocrystals. (M26, M21, Zn)

353-M. Relative Interfacial Energies of Symmetrical Tilt Grain Boundaries in Silver. K. T. Aust. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, sec. 2, Aug. 1956, p. 1026-1029.

Experimental details and observations. (M26, Ag)

354-M. A New Etching Reagent for Steel and Cast Iron. B. V. Guellard. *Metallurgia,* v. 54, no. 322, Aug. 1956, p. 93-96, 106.

Sodium bisulphite has proved su-

perior to some of the etchants in everyday use. It can be used to reveal phosphorus-rich areas and chemical segregation at the grain boundaries. (M21, ST, CI)

355-M. Surface Metallography Solves Production Problems. I. How to Select and Prepare a Specimen. A. T. Steer, *Metalworking Production,* v. 100, Aug. 3, 1956, p. 1202-1208.

The surface inward to a depth of 0.0001 to 0.001 in. examined by projection micrography at 2000 magnifications. (To be continued.) (M21)

356-M. A Macro Grain Size Technique for Uranium. H. R. Gardner. *Hanford Atomic Products Operation (U. S. Atomic Energy Commission),* HW-41343, Feb. 1956, 16 p.

Technique developed for estimation of the grain size of beta heat treated uranium. A more reproducible and meaningful estimate of grain size is obtained than with the existing micro (100X) technique. (M28, U)

357-M. Effect of Chemical Composition on the Properties of Steel. B. R. Nijhawan. *Tisco,* v. 3, July 1956, p. 104-112.

General effects of chemistry on the phase diagram, influence of carbon, manganese, sulphur, silicon and phosphorus, effects of alloying elements, alteration in hardenability by changes in chemical composition. (M24, Q29, ST)

358-M. (Czech.) **Structure and Energy at Grain Boundaries of Metals.** F. Erdmann-Jesnitzer. *Hutnické Listy,* v. 11, no. 7, July 1956, p. 424-433.

Outlines electron theory of mutual action of the matrix and of foreign atoms in the matrix for iron and steel. (M27, M26, Fe, ST)

359-M. (French.) **A Contribution to the Study of the Structure of Copper-Tin-Zinc and Copper-Tin-Phosphorus Alloys.** Pierre Julien le Thomas and Dominique Arnaud. *Fonderie,* no. 126, July 1956, p. 274-282.

A study of the breaking mechanism under simple tension in tin bronzes in relation to their tin or phosphorus content. Determination of grain coarseness of these alloys in relation to the delta phase. Attempts to predict the tension characteristics at any given point in the piece. (M27, Q27, Cu, Sn)

360-M. (French.) **Kinetic Study, by Electronic Diffraction, of Structural Transformations and of Oxidation Processes. Advantages Obtained When Using Various Pressures.** J. J. Trillat. *Revue de Metallurgie,* v. 53, no. 7, July 1956, p. 497-502.

Continuous recording of electron diffraction permits kinetics of many transformations to be studied at various temperatures. (M22, N8, R2)

361-M. (German.) **Intermetallic Phases With α Manganese Structure in Austenitic Chromium-Nickel-Molybdenum Steel with High Titanium Content.** Walter Koch and Christa Ilschner-Gensch. *Archiv für das Eisenhüttenwesen,* v. 27, no. 7, July 1956, p. 453-457.

Separation and analysis of the intermetallic phase. (M26, AY)

362-M. (German.) **Atomic Imperfections in Structure of Crystals.** A. Steinemann. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 22, no. 7, July 1956, p. 226-237.

Atomic three-dimensional imperfections, their effect on diffusion, conductivity and optical properties, their detection. (M26)

363-M. (Italian.) **New Electrolytic Reagents for Stainless Steels Containing σ-Phase.** J. Bertetti. *Metallurgia Italiana,* v. 48, no. 7, July 1956, p. 324-326.

The new electrolytic etchants, ammonium persulphate and sodium bromate, were tested to differentiate the sigma phase in stainless, ferritic or austenitic steels. (M21, SS)

364-M. (Russian.) **Ionization X-Ray Structural Investigation of Bismuth Telluride.** F. I. Vasenin and P. F. Konovalov. *Zhurnal Tekhnicheskoi Fiziki,* v. 26, no. 7, July 1956, p. 1406-1414.

Close correlation between redistribution of relative intensity of interference lines and the inversion of the sign of thermo-electromotive force. Associated with this is the existence of two modifications of bismuth telluride. (M26, P15, Bi, Te)

365-M. (Swedish.) **On the Oxygen Content of Wüstite in Equilibrium With Various Gas Phases.** N. A. Hovgard and P. N. Jensfelt. *Jernkontorets Annaler,* v. 140, no. 7, 1956, p. 467-493.

The systems iron-carbon-oxygen and iron-hydrogen-oxygen studied by the reduction of pure Fe_2O_3 with mixtures of carbon dioxide and carbon monoxide at temperatures of 810, 980 and 1150° C. (M24, Fe)

366-M. Notes on Gold Amalgam Crystals. J. J. Frankel. *Chemical, Metallurgical & Mining Society of South Africa, Journal,* v. 56, July 1956, p. 451-456.

Method of preparation, composition and crystallography. X-ray powder photographs show that all the forms prepared over 20 to 95°

C. range consist of polycrystalline aggregates of minute cubic crystals, although the original crystal shapes are retained. (M26, Au)

367-M. The Electrical Properties of Dislocations in Germanium. J. W. Allen. *Journal of Electronics,* v. 1, ser. 1, May 1956, p. 580-588.

The electron energy levels at an edge dislocation will be considerably modified by the presence of a Cottrell impurity atmosphere. (M26, P15, Ge)

368-M. The Strength of Lomer-Cottrell Sessile Dislocations. A. N. Stroh. *Philosophical Magazine,* v. 1, 8th ser., no. 6, June 1956, p. 489-502.

Estimation of the size of the piled-up group of dislocations which the sessile dislocation can withstand under conditions of stress and temperature. (M26)

369-M. Some Properties of Vacancies and Interstitials in Cu_3Au. R. A. Dugdale. *Philosophical Magazine,* v. 1, 8th ser., no. 6, June 1956, p. 537-559.

Activation energies for formation and migration of vacancies, the vacancy ordering mechanism, decay of excess vacancies, behavior of interstitials. (M26, Cu, Au)

370-M. Metallography of Titanium-Stabilized 18-8 Stainless Steel. T. V. Simpkinson. *American Society for Metals, Transactions,* v. 49, *Preprint No.* 29, 1956, 27 p.

The effect of various heat treatments upon the formation and solution of carbides and sigma phase in Type-321 stainless steel studied metallographically. (M27, SS)

371-M. Effect of Sigma Phase on Co-Cr-Mo Base Alloys. Ronald Silverman, William Arbiter and Frank Hodi. *American Society for Metals, Transactions,* v. 49, *Preprint No.* 31, 1956, 21 p.

The density, electrical resistivity, R_A hardness, impact strength and stress-to-rupture life of the five alloys studied proved to be related to the amount of sigma phase present. (M27, P10, P15, Q general, Co, SG-h)

372-M. The Influence of Molybdenum on the Phase Relationships of a High Temperature Alloy. H. J. Beattie, Jr., and F. L. VerSnyder. *American Society for Metals, Transactions,* v. 49, *Preprint No.* 35, 1956, 17 p.

A series of six nickel-base alloys of constant base composition with the exception of molybdenum, which was varied from 0 to 11% by weight, studied by correlating the results of light and electron metallography, X-ray and electron diffraction. (M26, N6, Ni, SG-h)

373-M. Constitution Studies on the System Magnesium-Zinc. K. P. Anderko, E. J. Klimek, D. W. Levinson and W. Rostoker. *American Society for Metals, Transactions,* v. 49, *Preprint No.* 41, 1956, 18 p.

Microscopic and X-ray evidence for the existence of MgZn and Mg_2Zn_3, solidification equilibria, invariant reactions that form the intermediate phases. (M24, Mg, Zn)

374-M. A Constitution Diagram for the Alloy System Titanium-Tin. Paul Pietrokowsky and Ellis P. Frink. *American Society for Metals, Transactions,* v. 49, *Preprint No.* 42, 1956, 26 p.

Titanium-tin binary alloys were studied by metallography, X-ray diffraction, incipient melting and thermal analysis methods. (M24, Ti, Sn)

375-M. Phase Relationships of the Calcium-Lithium System. Milton R. Wolfson. *American Society for Metals, Transactions,* v. 49, *Preprint No.* 44, 1956, 10 p.

The phase diagram was determined by thermal analysis and relative hardness data. (M24, Ca, Li)

376-M. (French.) **The Preparation and Study by Electron Diffraction of Metallic Alloys in Thin Layers.** Pierre Michel. *Annales de Physique,* v. 1, ser. 13, July-Aug. 1956, p. 719-744 + 2 plates.

Structure of deposits obtained by condensation of metallic vapors on various carriers at air temperature. (M22, L25, M26)

377-M. (French.) **Experimental Determination of the Densities of Dislocations in Undeformed Metallic Crystals.** H. Lambot. *Revue Universelle des Mines,* v. 12, no. 99, ser. 9, Aug. 1956, p. 228-232.

Critical review of present methods. Densities obtained from optical measurement of corrosion pits are compared with those obtained by diffraction of X-rays. Both methods are satisfactory. (M26, P10)

378-M. (Hungarian.) **How Does Radiography Aid Metallurgy?** Robert Forbath and Elemer Kalmar. *Kohaszati Lapok,* v. 11, no. 7, July 1956, p. 305-309.

Basics of application of radioactive isotopes. Applications in the literature. Applications planned, such as studies of the wear of furnace linings, the effect of the sulphur content of mazut on steel production and in materials testing. (M23, S13, S19, Q9)

379-M. (Japanese.) **Studies on Ball Bearing Steels. X-Ray Determination of Retained Austenite by Integrated Intensities.** Manabu Ueno, Tesutaro Mitsuhashi and Yutaka Nakano. *Journal of Mechanical Laboratory, (Japan.),* v. 10, no. 4, July 1956, p. 125-131.

Monochromatic cobalt Kα X-rays were obtained by the diffraction of cobalt radiation from a lithium fluoride single crystal and used to determine quantitatively the retained austenite. (M22, N8, ST)

380-M. (Polish.) **Equilibrium States in the Chemical Constitution of Fe-Si-O.** *Hutnik,* v. 23, no. 6, June 1956, p. 233-238.

Components in the liquid state of Fe-Si-O, possible chemical combinations, concentrations of the components at equilibrium. Activity coefficients of the individual components. (M24, N14, P12, Fe, Si)

381-M. (Polish.) **The Determination of the Iron-Carbon System.** *Hutnik,* v. 23, no. 7-8, July-Aug. 1956, p. 270-276.

Körber's method of computing the iron-carbon curve. Newer methods, the tabular method and its application, the solubility of graphite and cementite in iron. (M24, Fe)

382-M. Metals, Perfect and Imperfect. T. E. Allibone. *Institute of British Foundrymen,* v. 48, p. 36A-44A.

The perfect and imperfect crystal, grain boundaries, slip bands, dislocations, "pure" metals. (M26)

383-M. How to Obtain Good Micrographs at High Magnification. Some Optical Points of View. S. Modin and L. E. Eriksson. *Henry Brutcher Translation No.* 3275, 12 p. (From *Jernkontorets Annaler,* v. 136, no. 1, 1952, p. 1-8.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 230-M, 1952. (M21)

384-M. (English.) **Fourier Analysis of X-Ray Diffraction Profiles Obtained From Tantalum Filings.** F. R. L. Schoening. *Acta Metallurgica,* v. 4, no. 5, Sept. 1956, p. 510-513.

Influence of hydrogen charge on shapes of diffraction lines obtained from cold worked metal. (M26, M22, Ta)

385-M. (English.) **The Pinning of Dislocations by X-Irradiation of Alkali Halide Crystals.** R. B. Gordon and A. S. Nowick. *Acta Metallurgica,* v. 4, no. 5, Sept. 1956, p. 514-527.

Pinning points on dislocations are created through release of vacancies within the volume of the crystal and migration of these vacancies to dislocations. (M26)

386-M. (English.) **Crystal Structures of Lithium-Magnesium Alloys at Low Temperatures.** C. S. Barrett. *Acta Metallurgica,* v. 4, no. 5, Sept. 1956, p. 528-531.

The crystal structures of lithium-rich lithium-magnesium alloys uniquely offer the possibility of testing theories of the influence of valence-electron concentration on hexagonal axial ratio in the range 1.0 to 1.16 electrons per atom. (M26, Li, Mg)

387-M. (English.) **Note on the Heating Effect of Moving Dislocations.** J. D. Eshelby and P. L. Pratt. *Acta Metallurgica,* v. 4, no. 5, Sept. 1956, p. 560-562.

It seems improbable that there can be appreciable local heating near the glide-plane, except perhaps at very high rates of loading. (M26, Q24, Q25)

388-M. (English.) **Some Problems of the Dynamic Theory of Non-Ideal Crystal Lattices.** M. Lifsic. *Nuovo Cimento, (Supplements),* v. 3, ser. 10, no. 4, 1956, p. 716-734.

Influence of a local irregularity on the oscillations of lattice atoms and on the crystal free energy. Other applications of the method. (M26)

389-M. (English.) **Structure Analysis by Electron Diffraction.** B. K. Vajnstejn. *Nuovo Cimento, (Supplements),* v. 3, ser. 10, no. 4, 1956, p. 773-797.

Several systems of analysis discussed and Soviet system described. (M22)

390-M. (English.) **Phase Diagram of Iron-Cobalt-Oxygen System. I. Experimental Study.** Shuichi Iida. *Physical Society of Japan, Journal,* v. 11, no. 8, Aug. 1956, p. 846-854.

Phase diagram was established above 900° C. Specific heat and variation of lattice constant and oxygen content with heat treatment were measured. (M24, P12, M26, Fe, Co)

391-M. (German.) **Colloquy on Progress in Surface Microscopy.** *Radex Rundschau,* no. 4-5, June-July 1956, p. 147-259.

Consists of 11 papers presented at Leoben, Austria, in November 1955 on such subjects of metallography as image contrast increase, electron mirror microscopy, field electron microscopy, microscopic direct observation of transformations, electron diffraction microscopy. (M21)

392-M. (German.) **Investigation of the Titanium-Aluminum System.** Konrad

Sagel, Elisabeth Schulz and Ulrich Zwicker. *Zeitschrift für Metallkunde,* v. 47, no. 8, Aug. 1956, p. 529-534.

Electrical measurements, X-ray analysis and metallographic investigation of the system in the range of 3 to 35% aluminum. (M24, Ti, Al)

393-M. (German.) **Systems Titanium-Aluminum-Chromium, and Titanium-Aluminum-Vanadium and the Alloys With 5% Cr and 3% Al as Well as With 6% Al and 4% V.** Ulrich Zwicker. *Zeitschrift für Metallkunde,* v. 47, no. 8, Aug. 1956, p. 535-548.

Above studies are of interest for the commercial alloys TiCr5Al3 and TiAl6V4. The kinetics of the phase changes of both alloys described with the aid of TTT-diagrams. (M24, N6, Ti, Al, Cr, V)

394-M. (Italian.) **Roentgenographic Researches on the η-Phase Cu-Sn.** C. Goria. *Metallurgia Italiana,* v. 48, no. 8, Aug. 1956, p. 358-360.

Studies of the roentgenograms of powders and of rotating crystals in solid solution. (M26, Cu, Sn)

395-M. (Russian.) **The Influence of Cold Treatment on the Characteristic Debye Temperature of Carbon Steel.** V. I. Korotkov and B. N. Finkel'shtein. *Doklady Akademii Nauk SSSR,* v. 108, no. 5, June 11, 1956, p. 846-847.

Method of determining the characteristic Debye temperature of cold worked carbon steel through measurement of the velocity of propagation of elastic waves in it, and of its density. Experimental measurements on a given steel indicate that the characteristic temperature is not affected by cold working. (M26, Q24, CN)

396-M. (Russian.) **Radiographic Study of Certain Alloys of Transition Metals With Silicon.** E. I. Gladyshevskii, P. I. Kripiakevich and Iu. B. Kuz'ma. *Fizika Metallov i Metallovedenie,* v. 2, no. 3, 1956, p. 454-456.

A radiographic study of alloys of the cobalt-manganese-silicon, nickel-manganese-silicon, copper-manganese-silicon, and iron-manganese-silicon systems. (M26, M24, Mn, Si, Co, Ni, Cu, Fe)

397-M. (Russian.) **Studying the Structure of Deformed Al-Cu Alloy With the Electron Microscope.** N. N. Buinov and O. D. Shashkov. *Fizika Metallov i Metallovedenie,* v. 2, no. 3, 1956, p. 484-488.

An electron microscopy study of the mechanism of plastic deformation in aged alloys of aluminum with 4% copper. Structure of the surface of deformed alloys is found to be representative of their inner structure. (M21, M27, Q24, Al, Cu)

398-M. (Russian.) **Constitution Diagram of the Binary Titanium-Aluminum System.** I. I. Kornilov, E. N. Pylaeva and M. A. Volkova. *Izvestiia Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk,* no. 7, July 1956, p. 771-778 + 1 plate.

A study of the phase diagram of the titanium-aluminum system by thermal, microstructure and X-ray crystal analyses and measuring hardness and heat resistance. (M24, Q29, Ti, Al)

399-M. (Russian.) **Metallographic and X-Ray Investigation of Alloys of the Germanium-Rhodium System.** N. N. Zhuravlev and G. S. Zhdanov. *Kristallografiia,* v. 1, no. 2, 1956, p. 205-208 + 1 plate.

Investigation shows the existence of several compounds in this system. Density and microhardness of the compounds. Solubility of rhodium in germanium and vice versa. (M24, N12, Ge, Rh)

400-M. (Russian.) **Electronographic Investigation of the Degree of Perfection of Single Crystals of Germanium.** S. A. Semiletov and Z. G. Pinsker. *Kristallografiia,* v. 1, no. 2, 1956, p. 209-213 + 2 plates.

Possibilities of the electronographic method (pictures with Kikuchi lines) in studying surface-layer structure of single crystals. (M26, M22, Ge)

401-M. (Russian.) **Using the Ultraviolet Microscope for Studying the Structure of Aluminum Alloys.** If. Kolobnev, N. A. Aristova, M. L. Bernshtein and E. N. Nikitina. *Zavodskaia Laboratoriia,* v. 22, no. 7, July 1956, p. 803-804 + 1 color plate.

Using the type GOI, MUF-2 ultraviolet microscope to study aluminum alloy castings. Ultraviolet microscope increases the resolution and differentiation. (M21, Al)

402-M. (Russian.) **Using the Microscope for Studying High-Temperature Processes.** I. N. Anikin. *Zavodskaia Laboratoriia,* v. 22, no. 7, July 1956, p. 805-806.

Using a binocular microscope with a focal length of 70 mm. which permits change in enlargement from 3 to 120 times. Can be used at temperatures up to 1000° C. (M21)

403-M. (Russian.) **A Contact Micro X-Ray Method of Studying Alloys and Alloy Steels.** B. A. Movchan. *Zavodskaia Laboratoriia,* v. 22, no. 7, July 1956, p. 817-820.

Method of exposing the nonhomogeneity of alloy steels, the striations of rolled steel, and the heterogeneity of grain in cast steel. (M23, AY, CI)

404-M. (Russian.) **Using Rapid Ionization X-Ray Structure Analysis for Studying Crystalline Substances.** P. F. Konovalov and A. I. Efremov. *Zavodskaia Laboratoriia,* v. 22, no. 7, July 1956, p. 824-827.

Apparatus for studying the structure of substances at high temperatures. Permits observation of all the events taking place in various crystalline substances and their mixtures over a whole range (or at definite points) of high temperatures. Permits study of the kinetics of thermal processes. (M22, M26)

405-M. (Russian.) **Detecting Laminated Fractures in Steel.** N. S. Fedotenko. *Zavodskaia Laboratoriia,* v. 22, no. 7, July 1956, p. 855-856.

Testing chromium steel by an improved method. Consists, essentially, in an added annealing step before the sample is studied. (M28, J23, AY)

406-M. (Russian.) **System Strontium-Bismuth.** S. A. Shchukarev, M. P. Morozova, Kan-Kho-Yn and G. V. Kokosh. *Zhurnal Obshchei Khimii,* v. 26, no. 6, June 1956, p. 1525-1531.

Thermal analysis and gram-atomic volumes show presence of the congruent-melting compounds $SiBi_3$, Sr_3Bi_2 and Sr_2Bi, and incongruent melting SrBi. (M24, Sr, Bi)

407-M. The Metallography of Irradiated Uranium—Preparation, Cathodic Vacuum Etching, and Replication. T. K. Bierlein, J. R. Morgan and G. R. Mallet. *Hanford Atomic Products Operation (U. S. Atomic Energy Commission),* HW-42184 (Rev.) May 1956, 33 p.

Equipment and techniques that have proved adaptable to remote manipulation. Metallographic results obtained on uranium irradiated in a reactor. (M21, M27, U)

408-M. Metallographic Methods for Highly Active Specimens. P. C. L. Pfeil. *Institute of Metals, Journal,* v. 84; *Institute of Metals, Bulletin,* v. 3, Aug. 1956, p. 108-111.

Methods for the metallographic examination of specimens having a high γ-activity. (M21, Zr, U)

409-M. Sub-Structure Formation in Slightly Bent Aluminium Single Crystals. H. J. Lambot. *Institute of Metals, Journal,* v. 84, Aug. 1956, p. 473-474.

High-resolution X-ray method was used in the study of high-purity aluminum (99.99%) having the cube orientation. (M26, N4, Al)

410-M. Observations of Dislocation Glide and Climb in Lithium Fluoride Crystals. J. J. Gilman and W. G. Johnston. *Journal of Applied Physics,* v. 27, Sept. 1956, p. 1018-1022.

Reagent CP-4 plus ferric ions can be used to detect the positions of dislocations. Technique is highly selective, and both edge and screw dislocations can be distinguished. (M26, M21)

411-M. Neutron Diffraction Study of Titanium-Zirconium System. S. S. Sidhu, LeRoy Heaton, D. D. Zauberis and F. P. Campos. *Journal of Applied Physics,* v. 27, Sept. 1956, p. 1040-1042.

System consists of a continuous series of random substitutional solid solutions of solvent and solute atoms. An alloy is developed that gives no coherent scattering reflections in its neutron diffraction pattern, and is extremely useful in constructing devices in which scattering of thermal neutrons is not desired. (M24, M22, Ti, Zr)

412-M. Application of the Orthogonalized Plane-Wave Method to Silicon Crystal. Truman O. Woodruff. *Physical Review,* v. 103, ser. 2, Sept. 1, 1956, p. 1159-1166.

Approximate solutions of the Hartree-Fock-Slater equations for a perfect silicon crystal were obtained. Estimates of the energy eigenvalues of the valence and conduction states are given. (M25, Si)

413-M. Electrical Resistivity Study of Lattice Defects Introduced in Copper by 1.25-Mev Electron Irradiation at 80° K. C. J. Meechan and J. A. Brinkman. *Physical Review,* v. 103, ser. 2, Sept. 1, 1956, p. 1193-1202.

Present results are compared with other work to understand the differences in recovery when irradiated by electron and cyclotron particles. (M26, P15, Cu)

414-M. Continuous Distributions of Dislocations, III. B. A. Bilby and E. Smith. *Royal Society, Proceedings,* v. 236, ser. A, Sept. 11, 1956, p. 481-505.

Correct equations for large curvatures are formulated. The relation between the fundamental node theorem of dislocation theory and certain theorems of generalized space is considered. (M26)

415-M. A Metallographic and X-Ray Study of Nickel Alloys of 20-30 Per Cent Molybdenum. D. W. Stoffel and E. E. Stansbury. *University of Tennessee (U. S. Atomic Energy Commission),* AECU-3105, Dec. 1955, 76 p.

Microstructures, hardness values and X-ray data for seven individual alloys. (M27, M26, Q29, Ni, Mo)

416-M. (English.) **Light-Figure Phenomena Revealed and Crystal Faces Developed by Chemically Etched Nickel-Copper Alloy Crystals.** Mikio Yamamoto and Jiro Watanabe. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 8, no. 2, Apr. 1956, p. 125-133.

Etching with boiling saturated aqueous solution of ferric chloride produces distinct light figures, while any other reagent reveals only an indistinct or no light figure. (M28, Ni, Cu)

417-M. (French.) **Influence of a Chromium Addition on the Microstructure of Al-Zn-Mg Alloys.** P. Brenner and M. Schippers. *Revue de Métallurgie,* v. 53, no. 8, Aug. 1956, p. 627-636; disc., p. 637.

Improves resistance to etching under stress and prevents, to a large extent, the formation of precipitated critical constituents at the grain boundaries. (M27, N7, Cr, Al, Zn, Mg)

418-M. (Russian.) **Investigating Nonmetallic Inclusions in Castings With Radioactive Isotopes.** B. B. Guliaev, Iu. F. Borovskii, Z. V. Sigalova and E. S. Sokolova. *Liteinoe Proizvodstvo,* no. 8, Aug. 1956, p. 25-27.

Studies primarily the inclusions carried into the casting from the walls of the mold. The tungsten-185 isotope was mixed into the molding sand and the amount of inclusions in the casting was determined by autoradiography. (M27, S19, E11, M23)

419-M. (Russian.) **X-Ray Method of Detecting Residual Austenite Using the Gradual Attenuation of Comparison Lines.** B. A. Brusilovskii. *Zavodskaia Laboratoriia,* v. 22, no. 8, Aug. 1956, p. 936-943.

Speed of method is limited only by the time of exposure. May be used in other fields for phase quantitative X-ray analysis. (M22)

420-M. (Russian.) **Method of Determining the Grain of Austenite.** I. E. Kontorovich and B. M. Voshedchenko. *Zavodskaia Laboratoriia,* v. 22, no. 8, Aug. 1956, p. 954-955 + 1 plate.

Studying austenite grain in steels using as the etching agent: 15 g. picric acid, 200 cc. ethyl ether and 200 cc. distilled water. (M21, ST)

421-M. (Russian.) **Application of the Generalized Center of Gravity Law in the Study of Multicomponent Eutectic Alloys.** L. S. Palatnik. *Zhurnal Fizicheskoi Khimii,* v. 30, no. 7, July 1956, p. 1438-1443.

Relationships were obtained between the primary phases of binary, tertiary and higher eutectics and the concentrations of the components. (M24)

422-M. (Russian.) **Investigation of the Lattice Constants of Aluminum-Manganese Alloys Following Various Kinds of Thermal Treatment.** I. N. Friedlyander, V. A. Konstantinov and N. I. Zaitseva. *Zhurnal Fizicheskoi Khimii,* v. 30, no. 7, July 1956, p. 1623-1625.

Data for rapidly crystallized alloys in the cast state and on quenching in water. The formation of a supersaturated solid solution of manganese in aluminum and its decomposition on heat treatment. (M26, J27, Al, Mn)

423-M. Basal Plane Development in Electrodeposited Hexagonal-Close-Packed Metals: Zinc, Titanium, and Zirconium. W. R. Opie. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Sept. 1956, p. 1192-1194.

A strong tendency exists for development of hexagonal faces which are actually the basal planes of the hexagonal close-packed lattice. When this development is pronounced, the deposits are very bright and mirror-like. (M26, L17, Zn, Ti, Zr)

424-M. Intermetallic Compounds Between Lithium and Lead. II. The Crystal Structure of Li_8Pb_3. A. Zalkin, W. J. Ramsey and D. H. Templeton. *Journal of Physical Chemistry,* v. 60, Sept. 1956, p. 1275-1277.

Material was prepared by fusing the two metals together in an argon atmosphere to avoid reaction with air. Single crystal patterns about the *a*-axis were photographed with the Weissenberg camera. (M26, Li, Pb)

425-M. Direct Study of Crystal Lattices and Their Imperfections. *Metallurgia,* v. 54, no. 323, Sept. 1956, p. 150.

Electron microscope study of platinum phthalocynanine crystal structure. (M26)

426-M. Metallurgical Aspects of Microradiography. J. J. Trillat. *Metallurgical Reviews,* v. 1, pt. 1, 1956, p. 3-30 + 8 plates.

Practical metallurgical applications of X-ray and electron microradiography. (M23)

427-M. Apparatus for Obtaining Heating and Cooling Curves. Lohr A.

Burkardt, William S. McEwan and Hayden W. Pitman. *Review of Scientific Instruments,* v. 27, Sept. 1956, p. 693-696.

Apparatus permits study of phase diagrams either by heating or cooling. Liquidus point may be determined with an accuracy which is dependent only on the size of the temperature increment as the last trace of solid melts. (M24)

428-M. (English.) **Structural Study of Iron Selenides $FeSe_x$. I. Ordered Arrangement of Defects of Fe Atoms.** Atsushi Okazaki and Kinshiro Hirakawa. *Physical Society of Japan, Journal,* v. 11, no. 9, Sept. 1956, p. 930-936.

Several compositions were studied by X-ray analysis. Pyrrhotite was one of the primary compounds examined. New phases were found in the region which was previously considered as the single-phase region. (M26, Se, Fe)

429-M. (Russian.) **Determination of Type of Alloy Equilibrium Diagrams in the High-Temperature Range by the Method of Spectral Analysis.** L. S. Palalnik. *Doklady Akademii Nauk SSSR,* v. 109, no. 1, July-Aug. 1956, p. 127-130.

Analysis of method and equations used. Basis of method is relation between effect of selective evaporation of components of an alloy and the corresponding equilibrium diagram. (M24, M23)

430-M. (Book—German.) **Handbook on Special Steel Metallography.** Eduard Houdremont. v. 1, 3rd Ed. 874 p. 1956. Springer-Verlag, Berlin, Germany. 220Dm.

Covers pure iron, iron-carbon steels, use of iron-carbon graphs, and alloy steels with manganese, nickel and chromium. (M general, N8, ST)

431-M. The Study of Epitaxy in Thin Surface Films. D. W. Pashley. *Advances in Physics,* v. 5, Apr. 1956, p. 173-240 + 10 plates.

Account of the electron diffraction evidence concerning the formation of an oriented overgrowth; considers relation of this evidence to existing theories. (M26)

432-M. Some Physical-Metallurgical Properties of Scandium, Yttrium and the Rare Earth Metals. Kenneth W. Herrmann, A. H. Daane and F. H. Spedding. *Ames Laboratory (U. S. Atomic Energy Commission),* ISC-702, Aug. 1955, 92 p.

Crystal structures and precision lattice parameters of these metals were investigated. High-purity metals were examined by powder, single crystal and back reflection X-ray diffraction techniques. (M26, P10, P15, N6, EG-g, Sc, Y)

433-M. Crystallography and the Phase Rule. A. R. Ubbelohde. *British Journal of Applied Physics,* v. 7, Sept. 1956, p. 313-321.

Surveys structural changes such as crystal lattice transformations on melting that produce increases of entropy. Attention directed toward pre-transition and pre-melting phenomena; occurrence of smeared or continuous transitions; occurrence of hysteresis. (M26, N general)

434-M. The Systems Aluminum-Tin and Aluminum-Lead-Tin. A. N. Campbell and R. Kartzmark. *Canadian Journal of Chemistry,* v. 34, Oct. 1956, p. 1428-1439 + 3 plates.

Solubility of tin in aluminum, between 400 and 645° C., was determined by an isothermal method. Eutectic temperature and composition of this system were determined. (M24, Al, Sn, Pb)

435-M. The Band Structure of Bismuth. V. Heine. *Physical Society, Proceedings,* v. 69, no. 439A, July 1956, p. 513-519.

Properties of bismuth and its alloys are considered. Discusses four particular aspects of the observed magnetic properties that make the hypothesis appear plausible. (M25, P16, Bi)

436-M. Phase Relationships in Magnesium Alloys. *U. S. Department of Commerce, National Bureau of Standards, Sixth Quarterly Progress Report* 4725, June 1956, 6 p. + 6 plates.

Determined solid solubility boundaries at the magnesium-rich end; identified phase in equilibrium with the magnesium-terminal solid solution; determined extent of two-phase region adjoining the one-phase region; established solidus and liquidus boundaries. (M24, N12, Mg)

437-M. (English.) **A Study of the Strain-Free Cutting of Metal Single Crystals.** Mikio Yamamoto and Jiro Watanabé. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 8, no. 3, June 1956, p. 230-242.

Construction of an etching-cutter; testing of various materials for the string of the cutter; use and comparison with paraffin techniques. (M21, Cu, Fe, Zn, Sn, Al, Ni)

438-M. (French.) **Electrochemical Behavior of Magnesium. pH Tension Equilibrium Diagrams of Systems Mg-H_2O, Mg-CO_2-H_2O and Mg-H_3PO_4-H_2O at 25° C.** J. Van Muylder and M. Pourbaix. *Centre Belge d'Etude de la Corrosion, Rapport Technique,* no. 39, Mar. 1956, p. 1-20.

Free enthalpies of standard formation. Reactions and equilibrium formulas. Interpretation of equilibrium diagrams. Magnesium behavior in presence of carbonates and of phosphates, corrosion, and reactive anodes. (M24, R general, Mg)

439-M. (German.) **Metallographic Preparation of Noble Metal Specimens by Cutting With a Microtome.** Gerhard Reinacher. *Zeitschrift für Metallkunde,* v. 47, no. 9, Sept. 1956, p. 607-613.

Grinding metallographic samples with emery papers can be advantageously replaced by cutting with a suitable microtome. (M21, EG-c)

440-M. (German.) **Etching Tests on Germanium Single Crystals.** Hans Achim Schell. *Zeitschrift für Metallkunde,* v. 47, no. 9, Sept. 1956, p. 614-620.

Crystals drawn vertically with various lattice orientations showed mostly (111)-planes. Development of etch pits was followed using preferential etchant. Density and distribution of dislocations can be compared with such tests. (M21, Ge)

441-M. (German.) **Electron Interference Investigation on Alloys Subject to Separation as a Thin Layer. I. System: Aluminum-Silver. II. System: Aluminum-Copper.** Albert Winkelmann. *Zeitschrift für Metallkunde,* v. 47, no. 9, Sept. 1956, p. 621-631.

In age hardening of the silver alloy the second phase segregates instantaneously from supersaturated solid solution into equilibrium state. In copper alloys the segregation rate rises with diminishing grain size. (M22, Al, Cu)

442-M. (German.) **Electron-Microscopic Investigation of the Structure of Thin Electrolytically Precipitated Metal Layers.** Ludwig Reimer. *Zeitschrift für Metallkunde,* v. 47, no. 9, Sept. 1956, p. 631-636.

Electrodeposited metallic layers removed from metal base lead to better replicas for electron microscope than well-known plastic replicas. Comparison of bright with dark field photographs provides important knowledge about grain size of layers. (M27)

443-M. (German.) **Determination of Fibrous Texture of Wire by Means of a Counter-Tube Goniometer.** Frank Haessner. *Zeitschrift für Metallkunde,* v. 47, no. 9, Sept. 1956, p. 649-652.

Fiber textures are easily investigated by attaching an auxiliary head to a counter goniometer suitable for determining textures of sheet materials. Results with hard drawn and recrystallized aluminum wire. (M23, Al)

444-M. (German.) **Dislocations and Allotropic Transformation. II.** Alfred Seeger. *Zeitschrift für Metallkunde,* v. 47, no. 9, Sept. 1956, p. 653-660.

A comparison based on dislocation theory between plastic deformation of crystals and allotropic transition with special reference to the nucleation problem. (M26, N6)

445-M. (German.) **Electron-Theoretical Investigation of Failures in Metals. III. Effect of Dislocation on the Crystal Density and Related Problems. IV. Electrical Resistance of Dislocations.** Alfred Seeger and Heinz Stehle. *Zeitschrift für Physik,* v. 146, no. 2, Sept. 1956, p. 217-268.

Effect of plastic deformation on crystal density. Nonlinear mathematical treatment of dislocated structure. (M26, P15)

446-M. (Russian.) **Chemical Nature of Tertiary Intermetallic Phases in Magnesium-Copper-Zinc, and Magnesium-Copper-Nickel, Systems.** V. I. Mikheeva and G. G. Bakaian. *Doklady Akademii Nauk SSSR,* v. 109, no. 4, Aug. 1, 1956, p. 785-786.

Comparison of these tertiary systems with the binary system of laves. (M24, Mg, Cu, Zn, Ni)

447-M. (Russian.) **Determination of Characteristic Temperatures and Distortions of the Lattice in Several High-Melting Metallic Compounds and Their Solid Solutions.** S. M. Nikolaeva and Ia. S. Umanskii. *Izvestiia Akademii Nauk SSSR, Seriia Fizicheskaia,* v. 20, no. 6, June 1956, p. 631-635.

Strength of interatomic bond in crystal lattice of titanium carbide. Relation of crystal-lattice distortions, diffusion and microhardness to composition of cobalt-aluminum and nickel-aluminum alloys. (M26, N1, Q29, Ti, Co, Al, Ni)

448-M. (Russian.) **X-Ray Study of the Plasticity of Beryllium Single Crystals.** R. I. Garber, I. A. Gindin, V. S. Kogan and B. G. Lazarev. *Izvestiia Akademii Nauk SSSR, Seriia Fizicheskaia,* v. 20, no. 6, June 1956, p. 639-640 + 2 plates.

Laue diffraction patterns before and after deformation. Dislocations of parts of the single crystal and

microtears along slip planes at temperatures from 200 to 800° C. (M26, Q24, Be)

449-M. (Russian.) **X-Ray Study of the Quality of Metal Surfaces Prepared by Rapid Machining.** T. Kh. Chormonov. *Izvestiia Akademii Nauk SSSR, Seriia Fizicheskaia,* v. 20, no. 6, June 1956, p. 703-705.

Relation of depth of propagation of plastic deformations in steel and in brass to rate of machining and feed. Distortions of second and third order are studied. (M26, Q24, G17, ST, Cu)

450-M. The Titanium-Hydrogen System. R. M. Haag and F. J. Shipko. *American Chemical Society, Journal,* v. 78, Oct. 20, 1956, p. 5155-5159.

The equilibrium pressure of hydrogen over titanium-hydrogen was measured at 300, 400 and 500° C. Similar measurements were made of titanium-deuterium and titanium-tritium. (M24, N15, Ti)

451-M. Defects in Germanium Crystals Grown From the Melt. E. Billig. *British Journal of Applied Physics,* v. 7, Oct. 1956, p. 375-376.

Distribution of etch pits over various parts of a crystal were studied and correlation was obtained with the lifetime of minority carriers and with transistor action. (M26, Ge)

452-M. X-Ray Scattering by Liquid-Metal Alloys (a Kinetic Approach). Rufus C. Ling. *Journal of Chemical Physics,* v. 25, Oct. 1956, p. 614-616.

Theory of liquids is extended to the case of liquid mixtures, and a formula for the X-ray scattering is developed. (M22, K, Na)

453-M. Delayed Yielding in a Substitutional Solid Solution Alloy. L. A. Shepard and J. E. Dorn. *Journal of Metals,* v. 8, sec. 2, *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Oct. 1956, p. 1229-1235.

Investigation of the effects of stress and temperature on delayed yielding arising from substitutional atom locking of dislocations in a face-centered-cubic alloy. (M26, Q23, Al)

454-M. Crystal Structure of Delta-Prime Plutonium and the Thermal Expansion Characteristics of Delta, Delta-Prime, and Epsilon Plutonium. F. H. Ellinger. *Journal of Metals,* v. 8, sec. 2, *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Oct. 1956, p. 1256-1259.

X-ray diffraction patterns were taken in powder cameras using filtered CuK radiation. Sample was composed of metal filings mixed with a proportion of silver powder and was contained in an evacuated capillary tube. (M26, P11, Pu)

455-M. Study of Ferrous Ternary Diagrams in Relation to Magnetic Interactions: Fe-Ni-Al System. Ulrich H. Roesler. *Journal of Metals,* v. 8, sec. 2, *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Oct. 1956, p. 1285-1289.

Thermodynamic analysis of the gamma loop in iron alloys was applied. The two separate parameters obtained describe influence of alloying elements upon magnetic transformation range and hypothetical martensite temperature. (M24, P16, Fe, Ni, Al)

456-M. Intermediate Phase in the Uranium-Zirconium System. A. N. Holden and W. E. Seymour. *Journal of Metals,* v. 8, sec. 2, *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Oct. 1956, p. 1312-1316.

System studied with particular regard to the existence, stability and mechanism of formation of intermediate phase. Phase diagram. (M24, U, Zr)

457-M. Gamma Loop Studies in the Iron-Silicon and Iron-Silicon-Titanium Systems. Gordon G. Bentle and W. P. Fishel. *Journal of Metals,* v. 8, sec. 2, *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Oct. 1956, p. 1345-1348.

Dilation studies were made on 15 binary and 38 ternary alloys to determine the Ac_3 transformation temperature. Points taken from temperature versus expansion curves were used to establish the limit of the gamma iron region. (M24, Si, Fe, Ti)

458-M. Direct Observations of the Arrangement and Motion of Dislocations in Aluminium. P. B. Hirsch, R. W. Horne and M. J. Whelan. *Philosophical Magazine,* v. 1, ser. 8, no. 7, July 1956, p. 677-684.

Electron optical experiments on aluminum foils have revealed individual dislocations in the interior of the metal, and their arrangement and movement were observed. (M26, Al)

459-M. (English.) **A Summation Method for Crystal Statistics.** David Park. *Physica,* v. 22, no. 10, Oct. 1956, p. 932-940.

Procedure is applied to evaluate

the spontaneous magnetization of square and cubical Ising lattices. (M26)

460-M. (English.) **Electron Diffraction Study on Thin Alloy Films of Aluminium-Silver System.** Denjiro Watanabe. *Physical Society of Japan, Journal*, v. 11, No. 10, Oct. 1956, p. 1072-1078.

The hexagonal close packed and cubic β' phases were examined; also, the processes by which equilibrium was obtained after successive heat treatments. (M22, M24, N9, Ag, Al)

461-M. (English.) **Heating and Cooling the Specimen in the Electron Microscope.** Kazuo Ito. *Revue Universelle des Mines*, v. 12, ser. 9, no. 10, Oct. 1956, p. 421-429.

Results obtained using this technique on an aluminum-copper alloy, on the selective oxidation of α-brass, and in the crystallization of mercury. (M21, Sg, Al, Cu)

462-M. (English.) **The β-Ray Microscope and Its Uses in Metallography.** D. J. Shapland, N. Feather and A. F. Brown. *Revue Universelle des Mines*, v. 12, ser. 9, no. 10, Oct. 1956, p. 446-453.

A lens system by which charged particles emitted from radioactive bodies can be focused, permitting resolutions of the order of 1μ to be obtained in autoradiographs of metal surfaces. (M23)

463-M. (English.) **Electron Metallography of Ferrous Materials.** J. Nutting. *Revue Universelle des Mines*, v. 12, ser 9, no. 10, Oct. 1956, p. 512-526.

Reviews contributions to ferrous transformation studies. (M21, N general, Fe)

464-M. (French.) **The Modern Methods of Electronic Metallography.** R. Castaing. *Revue Universelle des Mines*, v. 12, ser. 9, no. 10, Oct. 1956, p. 454-465.

Recent improvements in the direct examination of a metal by electron transmission. (M21)

465-M. (French.) **The Use of the Electron Microscope in the Study of Phase Transformations in the Solid State in Nonferrous Metals and Alloys.** A. Saulnier. *Revue Universelle des Mines*, v. 12, ser. 9, no. 10, Oct. 1956, p. 486-500.

The electron microscope easily permits study of these states, giving much information on the structures of these alloys. (M21, N general)

466-M. (French.) **Some Results From Studies With the Electron Microscope of Ni-Cr-Al-Ti Alloys Used in Aeronautical Turbines.** Y. Baillie. *Revue Universelle des Mines*, v. 12, ser. 9, no. 10, Oct. 1956, p. 507-512.

Results obtained during kinetic studies of the fine structure appearing in nickel: chromium: aluminum: titanium alloys by the replica method. (M21, T24, Ni, Cr, Al, Ti)

467-M. (French.) **Morphological Study of Rupture Surfaces With the Electron Microscope.** J. Plateau, G. Henry and C. Crussard. *Revue Universelle des Mines*, v. 12, ser. 9, no. 10, Oct. 1956, p. 543-554.

Classical rupture types (ductile, intergranular, cleavage) and fatigue ruptures examined by the carbon replica technique. (M21)

468-M. (French.) **Electron Metallography of Pure Iron and Mild Steel.** F. van Wijk. *Revue Universelle des Mines*, v. 12, ser. 9, no. 10, Oct. 1956, p. 555-558.

Samples were examined after electrolytic polishing. There is evidence that the structures observed are related to the dislocation theory. (M21, Fe, ST)

469-M. (German.) **Boundaries and Their Constituents in Iron Materials.** Hans-Kurt Görlich. *Revue Universelle des Mines*, v. 12, ser. 9, no. 10, Oct. 1956, p. 465-470.

Nature, properties and importance of boundaries in metallic polycrystals. A method of isolation which conserves the original position of boundary constituents is developed. (M27, Fe)

470-M. (German.) **Carbide Isolation, a New Method of Examination in Electron Microscopy.** Hans Goossens. *Revue Universelle des Mines*, v. 12, ser. 9, no. 10, Oct. 1956, p. 471-476.

Method permits isolation of carbides from the matrix, while conserving their relative position. (M21)

471-M. (German.) **Structural Modifications in Ferritic and Austenitic Special Steels by Prolonged Stresses at High Temperatures.** A. Schrader. *Revue Universelle des Mines*, v. 12, ser. 9, no. 10, Oct. 1956, p. 537-543.

Electron microscope studies of a series of refractory steels submitted to creep tests. (M21, Q3, AY)

472-M. (German.) **Exposure Diagrams for X-Ray Coarse Structure Photography of Titanium.** G. Schuhmacher. *Technische Mitteilungen Krupp*, v. 14, no. 4, Sept. 1956, p. 114.

Diagram is presented and explained. (M22, M26, Ti)

473-M. (Russian.) **Investigation of the Five-Component System, Nickel-Chromium - Tungsten - Titanium - Aluminum.** I. I. Kornilov, L. I. Priakhina and O. V. Ozhimkova. *Izvestiia Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk,* no. 8, Aug. 1956, p. 885-888.

Investigation in the region of nickel solid solution using a spatial system. Study of alloys with variable content of aluminum, titanium and tungsten resulted in formulating alloys with high mechanical properties.
(M24. Q general, Ni, Al, Ti, W. Cr)

474-M. (Russian.) **Relation Between Mechanical Properties of Solids and Reaction of Atoms in Lattice.** B. M. Rovinskii. *Izvestiia Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk,* no. 9, Sept. 1956, p. 55-64.

Attempt to determine the relation between mechanical properties of solids and bond strength of atoms in the lattice. (M26, Q general)

475-M. (Russian.) **Crystalline Orientation in Electrolytically Precipitated Tin.** S. M. Kochergin and V. N. Nikulin. *Zhurnal Fizicheskoi Khimii,* v. 30, no. 8, Aug. 1956, p. 1727-1728 + 1 plate.

Effect of electrolyte condition on the crystalline orientation of tin in a sulfuric acid bath. Effect of current density. (M26, N12, Sn)

476-M. (Russian.) **Calculation of Simple Equilibrium Diagram of Ternary Alloys. I. General Equations and Their Solution in Case of Dissociation Without a Phase Transition.** B. Ia. Pines. *Zhurnal Tekhnicheskoi Fiziki,* v. 26, no. 9, Sept. 1956, p. 2108-2118.

General equations of 2, 3 and 4-phase equilibrium in a ternary system. (M24)

477-M. Constitution of Nickel-Rich Quaternary Alloys of the Ni-Cr-Ti-Al System. A. Taylor. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Sec. 2, Oct. 1956, p. 1356-1362.

Quaternary system was studied up to 1150° C. for compositions greater than 50 at. % nickel. The region contains six single-phase areas.
(M24, Ni, Ti, Cr, Al)

478-M. (French.) **Study, by Electron Diffraction, of the Crystallization and Oxidation of Thin Germanium Films.** J. J. Trillat, L. Tertian and A. Fourdeux. *Vide,* v. 11, no. 64, July-Aug. 1956, p. 190-193.

A study of the transformations taking place in very thin germanium films obtained by thermal evaporation from the amorphous state at low temperature to well crystallized germanium dioxide at 600° C.
(M26, Ge)

479-M. (Russian.) **Radiographic Investigation of Intercrystalline Nonhomogeneity of Sulphur and Phosphorus in Welded Joints.** B. A. Movchan and L. A. Pozniak. *Avtomaticheskaia Svarka,* v. 9, no. 4, July-Aug. 1956, p. 76-87.

Effect of cooling and heating on the crystalline nonhomogeneous distribution of sulphur in the welding joint metal. (M26, K9, ST)

480-M. (Russian.) **The De Haas-Van Alphen Effect for the Firmly Bound Electrons of the Lattice.** G. E. Zil'berman. *Fizika Metallov i Metallovedenie,* v. 3, no. 1, 1956, p. 18-21.

Oscillations of physical quantities with a changing magnetic field are treated on the basis of the model of firmly bound electrons with varying degrees of occupation of the energy zone. A criterion for the occupation of the zone is derived.
(M25, P16)

481-M. (Russian.) **Classification of Ternary Metallic Phases.** B. K. Vul'f. *Fizika Metallov i Metallovedenie,* v. 3, no. 1, 1956, p. 97-112.

A system of classifying ternary metallic phases according to the area and location of the homogeneity zones in ternary equilibrium diagrams. Comparison with other classification systems. (M24)

482-M. (Book—German.) **Constitution of Ternary Metallic Systems.** W. Guertler. Not paged. 1956. Gemeinnütziges Archiv für Metallkunde, Berlin, Germany.

Graphs of 10 ternary iron combinations and their austenitic relations. (M24, Fe, Mn, Co, Ni, Cu)

483-M. (Book—German.) **Handbook of Special Steel Metallography.** Eduard Houdremont. 3rd Rev. Ed. v. II. 1538 p. 1956. Springer-Verlag, Berlin, Germany.

Structure and properties of steels containing tungsten, molybdenum, vanadium, cobalt, silicon, aluminum, copper, oxygen, nitrogen, hydrogen, phosphorus, sulfur, titanium, columbium, tantalum, boron and rare metals. (M general, Q general, AY)

SECTION N

TRANSFORMATIONS and RESULTING STRUCTURES

1-N. Liquidus Curves for Aluminum Cell Electrolyte. I. Cryolite-Alumina. N. W. F. Phillips, R. H. Singleton and E. A. Hollingshead. *Electrochemical Society, Journal,* v. 102, Nov. 1955, p. 648-649.

Curves up to 1050° C. and 16% alumina determined by cooling curves and visual examination of cooling melt. Graph. 6 ref. (N12, Al)

2-N. Studies on Diffusion. I. Diffusion of Radioactive Matter Through Plates. U. Aswathanarayana and S. Ramamurthy. *Indian Academy of Sciences, Proceedings,* v. 42, sec. A, Aug. 1955, p. 71-76.

Studies plates of different thicknesses as compared to alpha-ray range of radio-nuclei and radioactive matter of different alpha-ray ranges. 15 ref. (To be continued.) (N1)

3-N. Intermediate Precipitates in Aged Binary Alloys of Aluminum with Cadmium, Indium, or Tin. J. M. Silcock. *Institute of Metals, Journal,* v. 23, Sept. 1955, p. 19-22.

Aged single crystals of aluminum containing 0.1 wt.-% cadmium, 0.05 wt.-% indium, or 0.05 wt.-% tin, have been examined by monochromatic X-ray methods. Tables. 10 ref. (N7, Al)

4-N. Metal Whiskers in Automatic Blanket Thermostats. J. B. Newkirk. *Metal Progress,* v. 68, Nov. 1955, p. 88-90.

Tiny filaments are single crystals growing from the cadmium plating. Diagram, photographs. (N5, M26, Cd)

5-N. (English.) Self-Diffusion in Dilute Binary Solid Solutions. R. E. Hoffman, D. Turnbull and E. W. Hart. *Acta Metallurgica,* v. 3, no. 5, Sept. 1955, p. 417-424.

Coefficient of self-diffusion of silver measured as function of atom fraction of substitutional solutes lead, copper, aluminum or germanium. Tables, graphs. 15 ref. (N1, Ag, Pb, Cu, Al, Ge)

6-N. (English.) BiMn "Spire" Growths Induced by a Magnetic Field. B. W. Roberts. *Acta Metallurgica,* v. 3, no. 5, Sept. 1955, p. 425-430.

Columns of highly oriented ferromagnetic bismuth-manganese crystallites have grown out of mixture of molten bismuth and particles of manganese metals. Diagrams, micrographs. 5 ref. (N12, Bi, Mn)

7-N. (English.) Self-Diffusion of Gold in Gold-Nickel Alloys. A. D. Kurtz, B. L. Averbach and Morris Cohen. *Acta Metallurgica,* v. 3, no. 5, Sept. 1955, p. 442-446.

Rate measured as function of composition and temperature in region of complete solid solubility, using an autoradiographic method to trace gold-198. Diagram, graphs, tables. 10 ref. (N1, Ni, Au)

8-N. (English.) Marker Movements in Titanium-Molybdenum Diffusion Couples and the Zener Theory of D_o. P. G. Shewmon and J. H. Bechtold. *Acta Metallurgica,* v. 3, no. 5, Sept. 1955, p. 452-455.

Anomalies leading to prediction of ring mechanism discussed; an alternative explanation, consistent with a vacancy mechanism, given. Table, graph. 12 ref. (N1, Ti, Mo)

9-N. (English.) Diffusion and Solubility of Nitrogen in Silicon-Iron. D. A. Leak, W. R. Thomas and G. M. Leak. *Acta Metallurgica,* v. 3, no. 5, Sept. 1955, p. 501-507.

Peaks corresponding to jumps of interstitial nitrogen atoms are connected with sites either identical with those in pure alpha-iron or in octahedra containing one silicon atom along tetrad axis. Graphs, tables, diagram. 21 ref. (N1, N12, Fe, Si, N)

10-N. (German.) **Crystallization of Antimony Deposited by Evaporation.** Adolf Götzberger. *Zeitschrift für Physik,* v. 142, no. 2, 1955, p. 182-200.

Experimental investigation of crystallization mechanism in fine layers of antimony made by different methods and resulting data. Photographs, graph, diagrams. 11 ref. (N12, L25, Sb)

11-N. (Russian.) **Stabilization of Residual Austenite of High-Speed and High-Chromium Steels Against Tempering.** Iu. A. Geller and R. P. Leshchinskaia. *Metallovedenie i obrabotka metallov,* 1955, no. 1, July, p. 26-33.

Importance of stabilization against tempering for steels whose tempering would cause martensitic transformation. Stabilization is achieved through soaking, low tempering (not causing martensitic transformation), or by increasing the chromium content in austenite. Graphs, table. 11 ref. (N8, AY, TS)

12-N. (Russian.) **Investigation of the Third Transformation in the Tempering of Steel.** A. P. Guliaev and N. I. Burova. *Metallovedenie i obrabotka metallov,* 1955, no. 1, July, p. 40-46.

The "third transformation" during tempering is not associated with carbide transformation, since it is found in carbon-free iron-manganese alloys and technical iron, and, in both cases, the carbide phase is absent. Cooling in liquid nitrogen increases the effect of this transformation, even in steels where the residual austenite was absent after quenching. X-ray analysis reveals that in the temperature range of the transformation, there is a considerable decrease of second order stresses. Graphs. 8 ref. (N8, AY)

13-N. Metallographic Study of Sodium, Potassium, Rubidium, and Caesium After Cooling to 1.2° K. Charles S. Barrett. *Institute of Metals, Journal,* v. 84, Oct. 1955, p. 43-46 + 1 plate.

Search for martensitic transformations. Diagram, micrographs. 11 ref. (N9, Na, K, Rb, Cs)

14-N. Relaxation of the Precipitated Copper Atoms in the Binary Alloy AuCu. R. Kamel. *Institute of Metals, Journal,* v. 84, Oct. 1955, p. 55-56.

Study of the kinetics of ordering in the gold-copper system. Diagrams. 6 ref. (N10, Au, Cu)

15-N. Theory of Crystal Growth. I. V. Salli. *Henry Brutcher Translation No.* 3546, 13 p. (Abridged from *Zhurnal eksper. i teoret. fiziki,* v. 25, no. 2 (8), 1953, p. 208-214.) Henry Brutcher, Altadena, Calif.

Correlates growth of crystals during isothermal crystallization. Explanation of effect of inoculants or ultrasound in the light of these correlations. Graph, diagrams. 5 ref. (N12)

16-N. (Czech.) **Isothermal Decomposition of Austenite in Tungsten-Alloyed Steels. I. Effect of Tungsten Upon the Isothermal Decomposition of Austenite in the Steel 25 MnCrV.** Josef Cadek. *Hutnicke listy,* v. 10, no. 10, Oct. 1955, p. 587-595 + 2 plates.

Tungsten influence, studied metallographically, thermomagnetometrically and by X-ray analysis of the electrolytically isolated carbide phase, shows that it increases the stability of austenite in the ferritic-pearlitic sphere and slightly increases it in the bainitic sphere. In four steels tested, carbide precipitated in the hypo-eutectoid ferrite. Graphs, photographs, tables. 10 ref. (N8, AY)

17-N. (Czech.) **Study of the Effect of Tungsten on the Rate of Nucleus Formation and on Velocity of Ferrite Growth.** Karel Mazanec and Ales Kalivoda. *Hutnické listy,* v. 10, no. 10, Oct. 1955, p. 580-587.

Effect of tungsten, in two structural chromium-tungsten-vanadium steel crystallizations, caused both crystallization parameters to decrease in the temperature ranges of 650 to 740° C., and also reduced carbon diffusion in austenite. Graphs, tables, micrographs. 19 ref. (N8, Fe)

18-N. (Russian.) **Possible Formation of Supersaturated Solid Solution in Aluminum Alloys by Quenching Their Liquid State.** I. N. Fridliander. *Doklady akademii nauk SSSR,* v. 104, no. 3, Sept. 21, 1955, p. 429-432.

Effect of concentration and heat treatment on electrical resistivity and its temperature coefficient of aluminum-manganese alloys. Change of crystal lattice after various types of heat treatment; shift of liquidus lines, eutectics and peritectics in aluminum-manganese alloys crystallizing at rapid rate of cooling. Graphs. 8 ref. (N12, P15, Al)

19-N. (Russian.) **Redistribution of Carbon at the Separation Surface of Heterogeneous Micro-Areas of Steel During Tempering.** S. F. Iur'ev and B. I. Bruk. *Doklady akademii nauk SSSR,* v. 104, no. 4, Oct. 1, 1955, p. 533-536.

Diffusion of carbon at fusion boundary at various tempering temperatures and without tempering;

heterogeneity of steel as a result of quenching, and the appearance of "heterogeneous contact" surface of different phases (austenitic, martensitic, ferritic and carbide). Role of carbide-forming elements, chromium and manganese, along boundaries of austenitic grains. Micrographs, graphs. 1 ref. (N1, N8, J29, ST)

20-N. (Russian.) **Phase Transformations in Steel With Rapid Electrical Heating.** A. P. Guliaev and V. M. Zalkin. *Metallovedenie i obrabotka mettallov,* 1955, no. 2, Aug., p. 15-20.

Transformation kinetic curves of pearlite to austenite during continuous heating; effect of heating rate on transformation; kinetics of isothermal transformation. Graphs. 6 ref. (N8, J22, AY)

21-N. (Russian.) **Isothermal Transformation of Austenite in Heat Resistant Steel.** R. P. Zaletaeva. *Metallovedenie i obrabotka metallov,* 1955, no. 2, Aug., p. 25-28.

Relation of variation in hardness to temperature and duration of isothermal soaking. Mechanical properties in relation to various quench and temper regimes. Graphs, table. (N8, J26, J29, Q general, SS)

22-N. (Russian.) **Basic Physical Factors of Crystallization.** V. N. Danilov, *Stal',* v. 15, no. 10, Oct. 1955, p. 909-913.

Contemporary theories of generation of crystallization centers and of crystal growth in connection with consecutive crystallization of a steel casting and the role of heat elimination. Influence of cooling regime and various impurities on crystallization kinetics in cast steel. Graphs. 5 ref. (N12, CI)

23-N. The Diffusion of Interstitial and Substitutional Elements in Titanium. J. E. Reynolds and R. I. Jaffee. *Battelle Memorial Institute, Titanium Metallurgical Laboratory Report No.* 21, Oct. 1955, 12 p.

Self-diffusion has not been determined, but activation energy has been estimated to be 77,000 cal. per mol. Review of available diffusion data and uses of diffusion data in general. Graph, tables. 25 ref. (N1, Ti)

24-N. Hydrogen in Steel. E. G. Ford, W. G. Linkert and N. A. Graham. *Chemistry in Canada,* v. 7, Nov. 1955, p. 31-35.

Trouble with blistering of a steel-backed babbitt thrust bearing caused by hydrogen diffusion prompted study; prolonged heat treatment offers only relief. Diagrams, graphs, photographs, table. 20 ref. (N1, J23, CN)

25-N. Widmanstätten and Other Abnormal Graphite Forms in Cast Iron. E. Bull Simonsen and Floyd Brown. *Foundry Trade Journal,* v. 99, Nov. 3, 1955, p. 499-505; disc., 505-509.

Appearance and condition of formation of a number of abnormal graphite forms in gray cast iron associated with impaired mechanical properties. Graphs, micrographs. 8 ref. (N8, Q general, CI)

26-N. Small-Angle X-Ray Scattering From Precipitates in Cold-Worked Al-Ag and Al Zn. J. P. Jan. *Journal of Applied Physics,* v. 26, Nov. 1955, p. 1291-1296.

Study of aging. Diagrams, graphs, tables. 25 ref. (N7, M22, Al)

27-N. Transformation Kinetics in Uranium-Chromium Alloys. D. W. White, Jr. *Journal of Metals,* v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Nov. 1955, p. 1221-1228.

Kinetics of isothermal transformation of beta-to-alpha uranium studied over a broad temperature range in alloys containing from 0.3 to 4.0 atomic % chromium. Graphs. 15 ref. (N6, U, Cr)

28-N. Compositional Changes of the Alpha Phase in a Eutectoid Cu-Al Alloy During Isothermal Transformation. Daniel F. Toner, Paul E. Gage and David J. Mack. *Journal of Metals,* v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Nov. 1955, p. 1228-1230.

Includes graphs. 7 ref. (N9, Cu, Al)

29-N. Aging Effects in Commercially Pure Beryllium. D. R. Mash. *Journal of Metals,* v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Nov. 1955, p. 1235-1240.

Beryllium samples responded to heat, quench and strain aging treatments. Possible means of obtaining increased normal temperature mechanical properties suggested. Graphs, tables. 4 ref. (N7, Q general Be)

30-N. Recrystallization Textures of a Cold-Rolled Aluminum Single Crystal. Y. C. Liu and W. R. Hibbard, Jr. *Journal of Metals,* v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Nov. 1955, p. 1249-1251.

A cold rolled aluminium single crystal essentially retains its initial orientation after 99.6% reduction in thickness. Orientation of recrystallized grains described in terms of crystallographic rotations about

principal poles of deformation texture. Diagrams. 8 ref. (N5, Q24, Al)

31-N. Fundamentals of Cold Working and Recrystallization. B. L. Averbach, M. Cohen, S. Allen, M. F. Comerford and C. Houska. *Massachusetts Institute of Technology (U. S. Atomic Enery Commission),* NYO-7075, June 1955, 3 p.

An X-ray study of recovery and recrystallization in an alloy containing 75% gold, 25% silver was combined with calorimetric data to obtain pertinent information on mechanism by which energy is stored in deformed metals.
(N5, Q24, Au, Ag)

32-N. Peritectic Reactions in Ternary Metal Systems. A. Prince. *Metal Treatment and Drop Forging,* v. 22, Nov. 1955, p. 485-489, 34 (adv.)

Includes diagrams. 3 ref.
(N12, M24)

33-N. Impurity Difusion in Crystals (Mainly Ionic Crystals With the Sodium Chloride Structure). A. B. Lidiard. *Philosophical Magazine,* v. 46, 7th ser., no. 382, Nov. 1955, p. 1218-1235.

Elementary lattice kinetic theory is applied to the problem of impurity diffusion by the vacancy mechanism. Experimental determinations of impurity diffusion coefficients throw a direct light on conditions existing within systems of interest in the field of color centers. Diagrams, graph. 19 ref. (N1, M26, Na)

34-N. Growth of Oriented Square Zinc Monocrystals. John J. Gilman and V. J. DeCarlo. *Review of Scientific Instruments,* v. 26, Nov. 1955, p. 1079-1080.

Method consists of two steps; first, cylindrical rods with specific orientations are made for subsequent use as seeds; then, square crystals are seeded in precision Pyrex tubes that have square cross sections. Diagram. (N12, Zn)

35-N. Changes in the Intensities of X-Ray Diffraction Lines During the Aging of a Ni-Cr-Ti-Al Alloy. G. V. Kurdyumov and N. T. Travina. *Henry Brutcher Translation No.* 3575, 10 p. (Abridged from *Zhurnal tekhnicheskoi fiziki,* v. 25, no. 2, 1955, p. 182-187.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 163-N, 1955.
(N7, M22, Ni, Cr, Ti, Al)

36-N. Study of Transgranular and Grain-Boundary Diffusion of Metals by Autoradiography. S. Z. Bokshtein, S. T. Kishkin, L. M. Moroz and T. I. Gudkova. *Henry Brutcher Translation No.* 3590, 6 p. (From *Doklady akademii nauk SSSR,* v. 102, no. 1, 1955, p. 73-75.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 259-N, 1955.
(N1, N12, M23, Pb, Fe, Ni)

37-N. (French.) Thermo-Electric Study of the Transformations of Iron-Chromium Alloys. Gilles Pomey and Jean Philibert. *Comptes rendus,* v. 241, no. 14, Oct. 3, 1955, p. 877-879.

Measuring the thermo-electric power makes it possible to follow the evolution of iron-chromium alloys close to equiatomic composition and to distinguish the order-disorder and alpha⩾sigma transformations. Graphs. 2 ref.
(N10, Fe, Cr)

38-N. (German.) Effect of Austenitizing Temperature on the Behavior of Structural Steels During Transformation and Hardening. Adolf Rose and Werner Strassburg. *Stahl und Eisen,* v. 75, no. 22, Nov. 3, 1955, p. 1472-1480.

Effect of austenitizing temperature on critical behavior in the pearlitic and bainitic stage and characteristic hardenability values. Hardenability is improved with the increasing austenitizing temperature of steels containing alloying elements that form special carbides. Graphs, tables. 10 ref.
(N8, J22, J26, AY)

39-N. (Russian.) Effect of Electrical Heating on Phase Transformations in Carbon and Chromium Steels. I. E. Kontorovich and A. G. Vinitskii. *Metallovedenie i obrabotka metallov,* 1955, no. 2, Aug., p. 21-25.

Effect of rate of heating on transformation temperature and resulting pearlitic and sorbitic structures; effect of temperature and rate of electrical heating on transformation time; change of hardness and electrical resistivity in relation to temperature and rate of heating; effect of chromium in carbon steel on transformation temperature and time. Graphs, tables. 2 ref.
(N8, AY)

40-N. Continuous-Cooling Transformation Characteristics Related to Weldability of a 0.5% C Steel. B. J. Bradstreet and R. L. Wilkins. *British Welding Journal,* v. 2, Dec. 1955, p. 562-566.

Studies by a direct-recording method, using a strain-gage dilatometer to operate a "function plotter", modified to draw simultaneous dilatation-temperature and time-temperature curves for a small steel specimen. Diagrams, tables, graphs, micrographs. 7 ref. (N8, K9, CN)

41-N. Precipitation of Copper in Germanium. R. A. Logan. *Physical Review,* v. 100, ser. 2, Oct. 15, 1955, p. 615-617.

When copper-doped germanium is cooled from a high temperature in regions of high dislocation density, significant precipitation occurs in a cooling cycle of only a few seconds. In order to prevent precipitation the sample must be quenched in a time of the order of 0.1 sec. Graphs. 11 ref. (N7, Ge, Cu)

42-N. (English.) **Dendrites and Growth Layers in the Electrocrystallization of Metals.** Gösta Wranglen. *Kungl. Tekniska Högskolans Handlingar (Transactions of the Royal Institute of Technology, Stockholm, Sweden), 1955,* no. 94, 42 p. + 13 plates.

A microscopic and microphotographic study. Diagrams, tables, photographs, micrographs. 47 ref. (N12)

43-N. (German.) **Structural Change of Germanium Vapor Deposited Layers Under the Electron Microscope.** E. W. Fischer and H. Richter. *Annalen der Physik,* v. 16, nos. 5-8, 1955, p. 193-209.

Germanium layers can undergo the following structural changes under the influence of electrons: transformation from amorphous to fine crystals, gathering crystallization, twinning, and crystallization from vapor phase. Diagrams, micrographs. 23 ref. (N15, Ge)

44-N. (German.) **Grain Formation and Change in Properties of High-Copper-Content Copper-Silicon and Copper-Manganese-Silicon Alloys.** M. Nony and K. L. Dreyer. *Metall,* v. 9, nos. 21-22, Nov. 1955, p. 947-954.

Discovery of a new phase in copper-silicon alloys. Change in electrical resistance and hardness in connection with structural transformation at different temperatures. Graphs, micrographs. 13 ref. (N3, P15, Q29, Cu)

45-N. (German.) **Lattice Transformation of Irreversible Iron-Nickel Alloys.** Klaus Stierstadt. *Zeitschrift für Metallkunde,* v. 46, no. 10, Oct. 1955, p. 751-755.

Study of alloys with a 3 to 25% nickel content using a high-frequency method. Relates temperature influence of transformation process, with ferromagnetic phenomena. Graphs, 10 ref. (N6, Fe, Ni)

46-N. (German.) **Regularity of Intergrowth Process in Crystals. I. Time-Temperature Law and Energy-Value.** Friedrich Erdmann-Jesnitzer and Martin May. *Zeitschrift für Metallkunde,* v. 46, no. 10, Oct. 1955, p. 756-764.

Cohesion of polycrystalline copper plane surfaces, temperature and time conditions, observation of cold pressure welding, lattice condition, state of energy. Table, graphs, diagram, micrographs. 11 ref. (N5, Cu)

47-N. The Effect of Alloying Elements on the Solubility of Nitrogen in Iron. II. The Solubility of Nitrogen in Alpha-Iron Containing up to 0.051% Vanadium. E. T. Turkdogan, S. Ignatowicz and J. Pearson. *Iron and Steel Institute, Journal,* v. 181, Nov. 1955, p. 227-231.

Solubility of nitrogen in alpha-iron, containing 0.016% and 0.051% vanadium, was investigated by equilibrating the alloys with ammonia-hydrogen mixtures at 500 and 600° C. The results indicate that amounts up to 0.051% vandaium have no influence on the solubility. Tables, graphs. 22 ref. (N12, Fe)

48-N. The Effects of Sulfur, Selenium, and Tellurium on Graphite Formation in an Fe-C-Si Alloy. S. Garber. *Iron and Steel Institute, Journal,* v. 181, Dec. 1955, p. 291-302 + 6 plates.

Effects of melting temperature and cooling rate on graphite formation have been determined on alloys of hypo-eutectic and eutectic composition. Changes of graphite morphology induced in the alloy by sulphur or selenium additions result from modifications in the nucleation of the graphite and from the growth rate of the eutectic austenite. Tables, graphs, diagram, micrographs. 25 ref. (N8, S, Se, Te)

49-N. The Isothermal Transformation Characteristics of Carburized 2% Nickel-Molybdenum Steel. G. Mayer and R. H. Hickley. *Metallurgia,* v. 52, no. 313, Nov. 1955, p. 236-239.

Isothermal-transformation diagrams of steels representing the core and four positions for a carburized 2% nickel-molybdenum steel were determined. The mechanical properties of steels of typical core composition are included. Graphs, tables. 11 ref. (N8, Q23, AY)

50-N. (French.) **Solubility Differences of Atomic and Molecular Hydrogen in Columbium.** Vladimir M. Vukanovic, Vukica M. Milutinovic and Stjepan S. Malcic. *Comptes rendus,* v. 241, no. 19, Nov. 7, 1955, p. 1298-1299.

By X-ray diffraction it is shown that atomic hydrogen solubility is higher than that of hydrogen in the molecular state. (N15, Cb)

51-N. (French.) **Gravimetric Study of the Influence of Impurities on the**

Rate of Diffusion in Alpha-Brasses. André Accary. *Comptes rendus,* v. 241, no. 19, Nov. 7, 1955, p. 1301-1304.

Determination of the influence of antimony, arsenic, phosphorus, silicon and aluminum content on the rate of diffusion by the zinc evaporation method. Graphs. (N1, Cu)

52-N. (French.) **Influence of Traces of Impurities on Polygonization of Aluminum.** Jean Montuelle. *Comptes rendus,* v. 241, no. 19, Nov. 7, 1955, p. 1304-1306.

Determination of influence of traces of impurities, in the form of sodium, lithium, iron and manganese on aluminum recrystallization when heat treated at 630° C. Micrographs, table. 2 ref. (N5, Al)

53-N. (French.) **The Solid Solubility of Sulphur in Iron and Ferromanganese Alloys.** E. T. Turkdogan, S. Ignatowicz, and J. Pearson. *Revue de métallurgie,* v. 52, no. 9, Sept. 1955, p. 725-730.

Solid solubility of sulphur in the gamma iron was determined as 0.013 and 0.031% at 1000 and 1200° C., respectively; with a 0.40 and 1.16% manganese content, the sulphur solubility is 0.0019 and 0.0007%, respectively, at 1200° C. Diagram, graphs. 7 ref. (N12, Fe, Mn, S)

54-N. (German.) **Growth of Layers During Reaction of Solid Iron With Aluminum and Aluminum-Alloy Melts.** Gustav Gürtler and Konrad Sagel. *Zeitschrift für Metallkunde,* v. 46, no. 10, Oct. 1955, p. 738-741.

Relationship between alloys, immersion temperature and formation of Al_5Fe_2 and Al_3Fe layers in respect to practical application. Tables, photographs, micrographs. 7 ref. (N12, Al)

55-N. (German.) **Single Crystals With Clean Surfaces.** E. Menzel, W. Stössel and M. Otter. *Zeitschrift für Physik,* v. 142, no. 3, 1955, p. 241-244.

Method for preparing high-quality spherical metal crystals, in high vacuum, by solidification on horizontal holders. Surface impurities are moved in front of the phase boundary, there producing a clean surface for further investigation. Photographs. 8 ref. (N12, Cu)

56-N. (Russian.) **Properties of Metallic Solutions. V. Influence of Zinc, Aluminum, Cadmium, Manganese, and Bismuth on Properties of Liquid and Solid Tin.** N. L. Pokrovskii and M. Saidov. *Zhurnal fizicheskoi khimii,* v. 29, no. 9, Sept. 1955, p. 1601-1609 + 1 plate.

Effect of alloying additions on the beta-alpha transformation in tin. Tables, graphs, diagrams, micrographs. 25 ref. (N6, Sn)

57-N. (Slovenian.) **Dislocation of Crystal Boundaries in Secondary Recrystallization.** Matija Zumer and Franc Sirca. *Rudarsko-metalurski zbornik,* 1955, no. 3, p. 173-178.

Study of ferrite grain changes in recrystallization at 1050 to 1100° C. Two possible mechanisms of the process. 4 ref. (N5, M27, ST)

58-N. Crystal Growth and Lattice Imperfections. C. Elbaum. *Canadian Metals,* v. 18, Dec. 1955, p. 36-38, 40.

Theoretical studies on growth of crystals from solutions and vapors, growth on dislocations and solidifications from the melt. Diagrams, micrographs. (N12, M26)

59-N. Solubility of Nitrogen in Alpha-Iron. J. D. Fast and M. B. Verrijp. *Iron & Steel,* v. 28, Nov. 30, 1955, p. 574-577; disc., p. 625-628.

Results of an investigation in which both the relation between quantity of dissolved nitrogen and internal friction and the solubilities of nitrogen in alpha-iron in equilibrium with N_2, Fe_4N, and "Fe_8N" were determined. Graphs, table. (N15, Fe)

60-N. Effect of Alloying Elements on Solubility of Nitrogen in Iron. I. The Solubility of Nitrogen in Pure Iron and in 2.83% Silicon Iron. II. The Solubility of Nitrogen in Alpha-Iron Containing up to 0.051% V. N. S. Corney, E. T. Turkdogan, S. Ignatowicz and J. Pearson. *Iron & Steel,* v. 28, Nov. 30, 1955, p. 577-582.

Determines free energies of solutions of nitrogen in solid iron; silicon reduces the solubility in α-iron and increases the activity coefficient of dissolved nitrogen. Investigates the influence of small percentages of vanadium in steel on the formation of nitrides at low-nitrogen potentials and consequently in lowering the solubility of nitrogen in iron. Diagrams, graphs, tables. (N15, Si, Fe)

61-N. Strain Aging of Alpha-Iron. W. R. Thomas and G. M. Leak. *Iron & Steel,* v. 28, Nov. 30, 1955, p. 583-586; disc., p. 628-631.

Precise data on rates of strain aging on specimens that contained only nitrogen and those with carbon only. Graphs, table. (N7, Fe)

62-N. Strain-Aging of Pure Iron. B. Jones and R. A. Owen-Barnett. *Iron & Steel,* v. 28, Nov. 30, 1955, p. 587-589; disc., p. 628-631.

Effect of preliminary temper-rolling and tensile-stressing. Graphs, tables. (N7, Q24, Fe)

63-N. Metallography of Delta-Ferrite. IV. Decomposition of Delta-Fer-

rite Between 650° and 1000° C. in a Low-Carbon 18/10/3 Cr-Ni-Mo Corrosion-Resisting Steel. V. δ-Eutectoid and the Constitution Diagram of the Fe-*M*-C System. Kehsin Kuo. *Iron and Steel Institute, Journal,* v. 181, Nov. 1955, p. 213-227 + 7 plates.

In the corrosion-resisting steel the ferrite decomposed into acicular austenite, sometimes containing carbide particles. Transformations were related to the various Fe-M-C phase diagrams. (N8, M24, SS)

64-N. Recrystallization in Metals as a Recovery-Nucleated Process. A. J. Kennedy. *Metallurgia,* v. 52, no. 314, Dec. 1955, p. 265-269.

Developments in ideas concerning origin and characteristics of recrystallization nuclei. Graphs. 33 ref. (N4, N5)

65-N. Aging Processes in Plain Carbon Steels and the Effect of Cyclic Stressing on Them. H. Schenck and E. Schmidtmann. *Henry Brutcher Translation No.* 3579, 12 p. (Part from *Archiv Eisenhüttenwesen,* v. 25, nos. 11-12, 1954, p. 583-588.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 107-N, 1955. (N1, N7, CN)

66-N. (English.) The Influence of Thin Intermediate Layers on Interdiffusion in Copper-Nickel Couples. M. L. Mehta and H. J. Axon. *Acta Metallurgica,* v. 3, no. 6, Nov. 1955, p. 538-541.

Effect of thin electrodeposited layers of gold, tin, zinc and cadmium on the interdiffusion between fully annealed nickel rod and electrodeposited copper. Graphs. 8 ref. (N1, L17, Cu, Ni)

67-N. (English.) Kinetics of Order-Disorder Transformations. G. J. Dienes. *Acta Metallurgica,* v. 3, no. 6, Nov. 1955, p. 549-557.

A simple theory, based on chemical rate theory, which is constructed entirely in terms of the long-range order parameter and reduces to the Bragg and Williams theory at equilibrium. Graphs, tables. 15 ref. (N10)

68-N. (English.) The Diffusivity of Hydrogen In Nickel. M. L. Hill and E. W. Johnson. *Acta Metallurgica,* v. 3, no. 6, Nov. 1955, p. 566-571.

Hydrogen diffusion determined at 380 to 1000° C. from nonsteady rates of hydrogen evolution. Diagram, graphs, tables. 21 ref. (N1, Ni)

69-N. (English.) An X-Ray Examination of Crystallographic Transformations in Indium-Rich Solid Solutions with Thallium, Lithium and Lead. A. Moore, J. Graham, G. K. Williamson and G. V. Raynor. *Acta Metallurgica,* v. 3, no. 6, Nov. 1955, p. 579-589.

Includes graphs, micrographs, tables. 19 ref. (N6, T1, Li, Pb)

70-N. (English.) Crystallographic Relationships in Aged Copper-Beryllium Alloys. J. S. Bowles and W. J. McG. Tegart. *Acta Metallurgica,* v. 3, no. 6, Nov. 1955, p. 590-597.

Geometrical features of the precipitation of CuBe described consistently by the phenomenological theory developed for martensitic transformations. Diagrams, micrographs, tables. 24 ref. (N7, N9, Cu)

71-N. (English.) Diffusion of Silver in Silver-Zinc and Silver-Cadmium Alloys. Tokutaro Hirone, Motoharu Kimura, Toshio Kitagaki, Nobuhiko Kunitomi and Yosimitsu Sugita. *Physical Society of Japan, Journal,* v. 10, no. 11, Nov. 1955, p. 967-970.

Diffusivity of silver (110) in alloys containing about 30% zinc or cadmium measured by means of surface counting. Results show that the silver atoms diffuse most rapidly in the lattice of silver-zinc and that the diffusivity of silver in silver-cadmium is still higher than that in silver itself. Graphs. 7 ref. (N1, Ag, Zn, Cd)

72-N. (English.) Aging Process in Quenched Aluminum-Zinc Solid Solutions. Ken-ichi Hirano. *Physical Society of Japan, Journal,* v. 10, no. 11, Nov. 1955, p. 995-1002.

Investigates relation between the low and high-temperature aging. Graphs. 17 ref. (N7, Al, Zn)

73-N. (English.) On the Magnetic Ageing of Pure Iron. II. Mitsuru Asanuma and Sinji Ogawa. *Physical Society of Japan, Journal,* v. 10, no. 11, Nov. 1955, p. 1025-1026.

Wire of commercial pure iron purified by annealing in a wet hydrogen atmosphere, 0.0065 wt.% nitrogen was dissolved into the specimen and the aging was investigated by the measurement of internal friction at 140° C. Graphs. 6 ref. (N7, Fe)

74-N. (English.) Formation of Superlattice in Face-Centered Cubic Lattice With a Special Reference to the Copper-Platinum System. Tokutaro Hirone and Kengo Adachi. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 7, no. 3, June 1955, p. 282-293.

Many types of superlattices appeared in the alloys of the system according to relative concentration changes of the component metals. This phenomenon was attributed to

the second neighbor interaction and to change of this value accompanied by an increase of *s*-electrons due to the addition of copper. Diagram, graphs, tables. 11 ref. (N10, Cu, Pt)

75-N. (German.) **The Shape of Particles During Precipitation of Carbide in Alpha-Iron.** W. Pitsch. *Acta Metallurgica,* v. 3, no. 6, Nov. 1955, p. 542-548.

Combines two experimental methods of internal friction and electrical resistivity to yield a parameter solely dependent on particle shape. Values of the deduced parameter indicate that the precipitated particles are plate-like. Diagrams, graphs, table. 16 ref. (N7, Fe)

76-N. (Japanese.) **Thermodynamic Investigation of Nonmetallic Inclusions in Steel. I. Behavior of Aluminum, Silicon and Iron-Nitrides and Their Effect on Austenitic Grain Size of Steel.** Hiroshi Sawamura and Toshisada Mori. *Iron & Steel Institute of Japan, Journal,* v. 41, no. 10, Oct. 1955, p. 1082-1090.

Both aluminum and silicon nitrides are estimated to be effective as grain-growth inhibitors, although the latter may be less effective than the former. Some considerations are given about nonmetallic inclusions which act as grain-growth inhibitors. Diagrams, tables, graphs. (N3, P12, ST)

77-N. (Japanese.) **Investigation of Boron Steel. II.** Sadao Koshiba, Kazuo Tanaka and Asao Inata. *Iron & Steel Institute of Japan, Journal,* v. 41, no. 10, Oct. 1955, p. 1108-1112.

Effects of 0.003 and 0.006% boron on the transformation, hardenability, quenched and tempered hardness, mechanical properties of manganese-chromium and manganese-chromium-molybdenum high-tensile steels. Table, graphs, micrographs. 1 ref. (N8, J26, Q general, AY)

78-N. Transformation Kinetics of Uranium-Molybdenum Alloys. H. A. Saller, F. A. Rough and A. A. Bauer. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* BMI-957, Oct. 1954, 26 p.

Investigates nature of the transformation product and kinetics of the metastable-gamma decomposition. Graphs, micrographs, table. 7 ref. (N6, U, Mo)

79-N. Thermal Diffusion in Liquid Metals. F. R. Winter and H. G. Drickamer. *Journal of Physical Chemistry,* v. 59, Dec. 1955, p. 1229-1230.

Theories on thermal diffusion in liquids and their application to data on binary organic mixtures. Results presented and discussed for three ternary mixtures. Graph, table. 8 ref.
(N1, Sn, Cd, Pb, Zn, Bi, Ga)

80-N. (English.) **Effect of Stresses on Hydrogen Diffusion in Steel.** F. de Kazinczy. *Jernkontorets annaler,* v. 139, no. 11, 1955, p. 885-892.

Hydrogen flow increases proportionally to stress up to the yield point, which indicates homogeneous diffusion through the lattice in annealed steel. Plastic deformation increases rate of flow, which may be due to stress multiplication in certain zones, probably along slip planes, in which hydrogen flow is thereby increased. Graphs, diagram. 9 ref. (N1, Q24, ST)

81-N. (French.) **Preparation of Monocrystals With Low Fusion Point. Description of New Equipment and Initial Results.** G. P. Bolognesi. *Revue de métallurgie,* v. 52, no. 11, Nov. 1955, p. 909-911.

Uses a vertical continuous-heating furnace which automatically adjusts mold temperatures up to 1000° C. Graph, diagrams, photographs. 4 ref. (N12)

82-N. (French.) **Processes to Obtain a Polygonized State With an Alpha-Brass Solid Solution.** H. J. Latiere and R. Michaud. *Revue de métallurgie,* v. 52, no. 11, Nov. 1955, p. 912-914.

Polygonized alpha-brass was made by fusion and quick cooling to avoid monocrystallization. Further working and annealing were required for stability. Laue patterns. 9 ref. (N5, Cu)

83-N. (German.) **Optical Investigation of the Reciprocal Diffusion of Metals.** Herwig Schopper. *Zeitschrift für Physik,* v. 143, no. 1, 1955, p. 93-117.

Determination of small diffusion coefficients for gold-lead alloys. (N1, Pb, Au)

84-N. (Russian.) **Pearlitic Transformation in Alloy Steel.** M. E. Blanter. *Metallovedenie i obrabotka metallov,* 1955, no. 4, Oct., p. 1-15.

Formation of carbides, and change of chromium, manganese, silicon, molybdenum and other contents in carbides and ferrite in relation to isothermal annealing time. Effect of alloying elements on kinetics of pearlitic transformation. Graphs, micrographs. 37 ref. (N8, AY)

85-N. (Russian.) **Effect of Stresses on the Processes of Aging the Alloy EI 437 at 750° C.** V. A. Parfenov. *Metallovedenie i obrabotka metallov,* no. 4, Oct. 1955, p. 16-19.

Microstructures and microcracks

in fatigue-tested specimens. Micrographs. 10 ref.
(N7, M27, Q25, Cr, Ni)

86-N. (Russian.) **Influence of Alloying Elements on the Graphitization Kinetics of White Cast Iron.** M. A. Krishtal. *Metallovedenie i obrabotka metallov,* no. 4, Oct. 1955, p. 24-27.

Order of intensity of influence by Al, Si, Ni, Co, Cu, V and Cr. Relation between distortion of lattice of alloyed austenite and absolute magnitude of difference of atomic diameters of alloying element and iron. Table. 21 ref. (N8, CI)

87-N. (Russian.) **Relation Between Position of Martensitic Point and State of the Austenite.** G. A. Oding. *Metallovedenie i obrabotka metallov,* no. 4, Oct. 1955, p. 28-31.

Intensiveness of austenitic transformation. Effect of rate of cooling. Stresses in individual austenitic grains. Graphs. 9 ref. (N8, ST)

88-N. (Russian.) **Causes of Crack Formation in Carburized Parts and Preventive Measures.** E. I. Malinkina. *Metatllovedenie i obrabotka metallov,* no. 4, Oct. 1955, p. 39-47.

Effect of carbon-content-temperature relation on austenitic-martensitic transformation and of isothermal transformation time, at various temperatures, on structure of carburized layer. Distribution of residual stresses. Graphs, micrographs, photographs. (N8, J28, Q26, ST)

89-N. Continuous-Cooling Transformation Diagram and Weldability of a 2½% Ni-Cr-Mo Steel. B. J. Bradstreet. *British Welding Journal,* v. 3, Jan. 1956, p. 30-32.

Preparation of the steel, weldability tests, dilation tests. Conditions for crack-free welds using low-hydrogen ferritic electrodes or austenitic electrodes. Tables, graphs, photograph. 9 ref. (N8, K9, ST)

90-N. Effect of Neutron Irradiation on the Precipitation-Hardening Reaction in Alloys Containing Beryllium. R. H. Kernohan, D. S. Billington and A. B. Lewis. *Journal of Applied Physics,* v. 27, Jan. 1956, p. 40-42.

Experimentation shows that neutron bombardment leads to the precipitation of more beryllium from solid solution than is obtained in an alloy held at the same temperature but in the absence of neutron bombardment. Graph. 10 ref.
(N7, Be)

91-N. Complex Growths of Graphite Spherulites in Cast Irons. K. P. Bunin, Yu. N. Taran and T. M. Shpak. *Henry Brutcher Translation No.* 3623, 4 p. (Abridged from *Doklady akademii nauk SSSR,* v. 101, no. 1, 1955, p. 65-67.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 214-N, 1955. (N12, CI)

92-N. (French.) **Summary Study of Isothermal Transformations in Duralumin.** Marcel Tournaire and Martial Renouard. *Technique et science aéronautiques,* 1955, no. 5, p. 297-302.

Isothermal quenching used for study of transformation curves in duralumin. Graphs. (N6, Al)

93-N. (German.) **Investigation of Phase Transformation in Austenitic Manganese Steel, Especially With Magnetite Suspension.** Kurt Hans v. Klitzing. *Archiv für das Eisenhüttenwesen,* v. 26, no. 12, Dec. 1955, p. 755-759.

Microscopic investigation of transformations after deformation, tempering at 350 to 650° C., and after low-temperature cooling in liquid air, with and without etching in picric acid solution. Micrographs. 14 ref. (N8, AY)

94-N. (German.) **Investigation of Growth in Austenitic Cast Iron.** W. Heinrichs and A. Dahlmann. *Technische Mitteilungen Krupp,* v. 13, no. 7, Dec. 1955, p. 147-166.

Contrary to the opinion that growth results from decomposition of carbide, a transformation of austenite and graphite into carbide at 750° C. could be observed. The length growth up to 550° C. is not greater than 0.70% and a growth of 0.40% probably will be obtained at 550° C. as a limiting value. Tables, graphs, diagram, micrographs. 12 ref. (N8, CI)

95-N. (Russian.) **Diffusion of Chromium in Solid Solutions of Nickel Alloys.** P. L. Gruzin and G. B. Fedorov. *Doklady akademii nauk SSSR,* v. 105, no. 2, Nov. 11, 1955, p. 264-267.

Diffusion coefficients determined by radioactive indicators. Relation of energy of activation to melting point of the various alloys tested. Tables, graphs. 8 ref. (N1, P12, Ni)

96-N. (Russian.) **Crystal Structure and Nature of Omega-Phase in Alloys of Titanium With Chromium.** Iu. A. Bagariatskii, G. I. Nosova and T. V. Tagunova. *Doklady akademii nauk SSSR,* v. 105, no. 6, Dec. 21, 1955, p. 1225-1228 + 1 plate.

Degree of dislocation in beta-omega transition and reorganization of lattice, even during rapid cooling, indicates a nondiffusion, martensitic type of transformation in an alloy with 5% chromium. Character of martensitic structures with supercooling depends on concentration of second element with titanium. X-

ray diffractogram, diagrams, tables. 5 ref. (N9, M26, Ti, Cr)

97-N. (Russian.) **Effect of Pressure on Transformation of Austenite Into Martensite.** A. I. Stregulin and N. P. Chuprakova. *Doklady akademii nauk SSSR*, v. 105, no. 6, Dec. 21, 1955, p. 1241-1243.

Relation between martensitic point and pressure. Comparison with and without pressure during cooling. Diagram, graphs, table. (N8, AY)

98-N. (Russian.) **Diffusion of Cobalt-60 in Cobalt Ferrites.** A. I. Borisenko and E. I. Morozov. *Doklady akademii nauk SSSR*, v. 105, no. 6, Dec. 21, 1955, p. 1274-1277.

Relation between temperature, composition and diffusion coefficient. Diffusion parameters. Graphs, table. 14 ref. (N1, Co, Fe)

99-N. (Russian.) **Use of Radioactive Isotopes to Study Effect of High-Melting Elements on Self-Diffusion of Iron.** S. Z. Bokshtein, V. A. Kazakova, S. T. Kishkin and L. M. Mirskii. *Izvestiia akademii nauk SSSR, otdelenie tekhnicheskikh nauk,* 1955, no. 12, Dec., p. 18-27.

Mechanism of diffusion underlying processes involved during heat treatment in metallic alloys. Decisive character of diffusion for behavior of metals, particularly at high temperatures. Effect of third component on temperature of self-diffusion. Tables, graphs. 11 ref. (N1, J general, Fe, Ni)

100-N. (Russian.) **Transfer of Potassium Ions in Simpler Liquid Slags.** O. A. Esin and A. K. Kir'ianov. *Izvestiia akademii nauk SSSR, otdelenie tekhnicheskikh nauk,* 1955, no. 12, Dec., p. 28-34.

To clarify nature of the slags, an investigation is undertaken to determine whether molten slags are electrolytes or semiconductors, by observing the rate of distribution and diffusion of "tagged" slag, and by variation of intensity with time in various divisions of electrolyzer before and during passage of current. Tables, graph, diagrams. 7 ref. (N14, B18)

101-N. (Russian.) **Defects of Crystal Structure of Quenched Steel.** K. P. Bunin and E. N. Pogrebnoi. *Izvestiia akademii nauk SSSR, otdelenie tekhnicheskikh nauk,* 1955, no. 12, Dec., p. 136-139.

Lattice distortions and microcracks in hardened martensite and austenite. Effect of quenching and other heat treatment on graphitization of iron-carbon alloys. Micrographs, graph. 10 ref. (N8, M26, J26, Fe, CN)

102-N. (Russian.) **Process of Graphite Formation in Magnesium Cast Iron.** K. I. Vashchenko and L. M. Sofroni. *Liteinoe proizvodstvo,* 1955, no. 11, Nov., p. 17-25.

Graphite content substantially below the eutectic crystallization temperature. Microstructure reveals that graphitization takes place in the solid state. Effect of chemical composition on graphitization. Tables, graphs, micrographs. 7 ref. (N8, M27, CI, Mg)

103-N. Theory of Nodular Graphite Formation in Ductile Cast Iron. Paul H. Anderson. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 163-169; disc., p. 169.

Hypothesis takes into account the effect of surface energies involved in the formation of graphite nodules from carbon precipitate rejected from the iron matrix. Crystallization of the graphite nodules is in the direction from the graphite-metal interface toward the nodule center. Diagram, tables. 14 ref. (N12, CI)

104-N. X-Ray Measurements of Order in the Cobalt-Platinum System. P. S. Rudman and B. L. Averbach. *Massachusetts Institute of Technology Department of Metallurgy (U. S. Atomic Energy Commission),* NYO-7051, Sept. 1955, 18 p.

Long-range order measured by means of X-ray intensity and lattice tetragonality measurements on powder briquettes quenched from various annealing temperatures. Graphs. 16 ref. (N10, Co, Pt)

105-N. Field Emission Microscopy of an Allotropic Transformation: α-β Titanium. Ernest G. Brock. *Physical Review,* v. 100, ser. 2, Dec. 15, 1955, p. 1619-1626.

Results show how the field emission microscope can be used to observe phase transformations in crystals of titanium; how a unique orientation relation between two phases can be demonstrated; and how individual crystals can be studied in their intermediate forms as they change phase. Diagrams, micrographs. 23 ref. (N6, M21, Ti)

106-N. Diffusion of Zinc in Single Crystals of Silver. A. Sawatzky and F. E. Jaumot, Jr. *Physical Review,* v. 100, ser. 2, Dec. 15, 1955, p. 1627-1629.

Studies at 640 to 925° C. An equation is derived which gives the diffusion coefficient with an accuracy of $\pm 2\%$. Graphs, table. 4 ref. (N1, Zn, Ag)

107-N. Effect of Antimony Impurity on Self-Diffusion of Silver. E.

Sonder. *Physical Review*, v. 100, ser. 2, Dec. 15, 1955, p. 1662-1666.

Measurements on alloy single crystals over a range of 500 to 900° C. to determine the existence and magnitude of changes, due to impurities, of the activation energy and frequency factor. Graphs, tables. 14 ref. (N1, Sb, Ag)

103-N. Effect of Pressure on the Superconducting Transition Temperature of Thallium. J. Hatton. *Physical Review*, v. 100, ser. 2, Dec. 15, 1955, p. 1784.

Investigations made at pressure up to nearly 5000 kg/cm². Graphs. 2 ref. (N11, P15, T1)

109-N. Recrystallization and Grain Growth Characteristics in Zirconium and Zirconium-Tin Alloys. F. D. Rosi and F. C. Perkins. *Sylvania Electric Products, Inc. (U. S. Atomic Energy Commission)*, SEP-113, June 1953, 36 p.

Information on alloy deformability by rolling, temperature range of recrystallization for several deformations, and temperature dependence of recrystallization and grain growth processes. Graphs, micrographs, tables. 18 ref. (N3, N5, Q24, Sn, Zr)

110-N. (Spanish.) **Contribution to the Study of the Secondary Hardening of Steels and Applications to Creep-Resistant Steels.** A. Constant and G. Delbart. *Instituto del hierro y del acero*, v. 8, no. 39, Oct. 1955, p. 441-458.

Examines different compounds, especially carbides and intermetallic compounds, whose precipitation is capable of producing hardening. Graphs, micrographs, tables. 22 ref. (N7, Q3, ST)

111-N. (Spanish.) **The Structure of Steel Ingots and Their Transformation by Known Forging and Rolling Processes.** Bernhard Matuschka. *Instituto del hierro y del acero*, v. 8, no. 39, Oct. 1955, p. 496-519.

Crystal structure and segregation in ingots, homogenization, variation of primary structure and crystallites during heating, mixing and decomposition of segregation zones, production of large forged pieces. Phase diagrams, photographs, table. (N5, M27, F21, F22, F23, ST)

112-N. (Spanish.) **Results of Measuring Damping in the Investigation of Iron.** Werner Köster. *Instituto del hierro y del acero*, v. 8, no. 39, Oct. 1955, p. 520-540.

Theory of delayed mechanical effects in technical irons, determination of solubility and diffusion coefficient of carbon and nitrogen in alpha-iron, kinetics of precipitation of carbon and nitrogen, influence of third elements, damping of deformed steel. Diagrams, graphs, micrographs. 36 ref. (N general, Q8, Fe)

113-N. Allotropic Transformations in Titanium, Zirconium, and Uranium Alloys. A. E. Dwight. *Argonne National Laboratory (U. S. Atomic Energy Commission)*, AECD-3673, Sept. 1953, 56 p.

Method is developed by which the influence of solute elements on the transformation temperature may be predicted when experimental data are lacking. Examples of applications of the calculated index in resolving conflicting data and estimating unknown phase diagrams. Graphs, table. 88 ref. (N6, Ti, U, Zr)

114-N. The Effect of Growth Conditions Upon the Solidification of a Binary Alloy. W. A. Tiller and J. W. Rutter. *Canadian Journal of Physics*, v. 34, Jan. 1956, p. 96-121 + 4 plates.

Extremely high-purity lead was produced by zone refining and from this material crystals containing known concentrations of tin, gold and silver were grown under a range of well-controlled growth conditions. Mode of solidification investigated by careful study of changes in appearance of the solid-liquid interface with change in growth conditions. Micrographs, graphs, tables, diagrams, photographs. 15 ref. (N12, Sn, Au, Ag, Pb)

115-N. Nucleation Frequencies for the Crystallization of Selenium Glass. W. B. Hillig. *Journal of Physical Chemistry*, v. 60, Jan. 1956, p. 56-58.

Selenium crystallization was studied within temperature range of 60 to 200° C. Nucleation frequency showed no dependence on temperature. Table. 12 ref. (N2, N12, Se)

116-N. The Formation of Austenite in Plain Carbon Steels at High Heating Rates. Robert A. Huggins, Harry Udin and John Wulff. *Welding Journal*, v. 35, Jan. 1956, p. 18S-26S.

Discussion of austenite formation at heating rates of 2000 to 20,000° C. per sec. Experimental procedures, structures and kinetics. Diagrams micrographs, graphs. 27 ref. (N8, ST)

117-N. (French.) **Structural Transition of Aluminum-Magnesium 7% Alloys by Tempering and Role of Mg₂Si in the Sensitizing to Intercrystalline Corrosion.** Adrian Saulnier. *Revue de l'aluminium*, v. 32, no. 226, Nov., 1955, p. 1011-1014.

Very minute particles of Al_3Mg_2 phase developed during early aging of the alloy at 200° C., coalescing

in time to form large rings. Silicon as an impurity, however, forms Mg_2Si with hardening and consequent intercrystalline corrosion. Micrographs, table. (N7, R2, Al, Mg)

118-N. (Russian.) **Kinetics of Changes in Microstructure of Metals and Alloys During Creep in Tension With High-Temperature Heating in Vacuum.** M. G. Lozinskii and E. I. Antipova. *Metallovedenie i obrabotka metallov,* no. 5, Nov., 1955, p. 9-14.

Changes in grain orientation in hypo and hypereutectoid steels and in copper-nickel alloys. Micrographs, diagrams, photograph, graphs. 4 ref. (N8, N5, Q3, AY, Cu, Ni)

119-N. Why Steel Is Heat Treatable. J. McAfee. *Australasian Engineer,* 1955, Dec., p. 54-60; disc., p. 60, 79.

A general account of the changes in structure and properties which take place during the heat treatment of steel, and of basic heat treatment operations. Diagrams, graphs, micrographs.
(N6, N8, J general, ST)

120-N. Beta Transformation in Titanium Alloys. F. C. Holden and R. I. Jaffee. *Battelle Memorial Institute, Titanium Metallurgical Laboratory Report No.* 25, Dec. 1955, 46 p.

A literature survey on the four types of beta transformation in alpha-beta titanium alloys. Mechanism and reaction kinetics of such transformations are summarized, particularly as related to heat treatment and thermal stability of alloys. Graphs, micrographs, tables, 6 app. 59 ref. (N6, J general, Ti)

121-N. The Diffusion of Uranium Into Aluminum. T. K. Bierlein and D. R. Green. *Hanford Atomic Products Operation (U. S. Atomic Energy Commission),* HW–38982, Oct. 1955, 23 p.

Methods used and results obtained in a study of the maximum rate of penetration in the temperature range 200 to 390° C. to provide a necessary basis for interpreting the effect of irradiation on diffusion rates. Diagram, graph, photograph, micrographs, table. 6 ref. (N1, Al U)

122-N. On the Recrystallization of Cold-Rolled Commercially Pure Titanium. Ichiji Obinata and Keizo Nishimura. *Institute of Metals, Journal,* v. 84, 1955-56, p. 97-101 +3 plates.

Study of recrystallization process, determination of recrystallization temperature and construction of diagram, based on determinations of grain size after annealing. Graphs, tables, diagrams, micrographs. 10 ref. (N5, J23, Ti)

123-N. The Effect of Temper-Rolling on the Strain-Ageing of Low-Carbon Steel. H. P. Tardif and C. S. Ball. *Iron and Steel Institute, Journal,* v. 182, Jan. 1956, p. 9-19.

The activation energy of the strain-aging process has been measured using the elongation at the yield point to determine the extent of aging. The two methods of prestraining, which were compared, were stretching in tension and temper rolling. The rate of return of the yield-point elongation has been compared with the increase in hardness and yield stress under the same conditions. Further experiments have been made to establish the cause of the retardation of the return of the yield point after temper rolling. Graphs. table. 12 ref.
(N7, F23, Q general, ST)

124-N. Reactions Involved in the First Stage Graphitization of Iron-Carbon-Silicon Alloys. W. S. Owen and J. Wilcox. *Iron and Steel Institute, Journal,* v. 182, Jan. 1956, p. 38-43.

The component reactions involved in the isothermal graphitization of a white iron-carbon-silicon alloy. The rate of growth of the graphite and of solution of cementite, the graphite nucleation frequency per unit volume and per unit austenite-cementite interfacial area, and the rate of decrease of the area were measured. The interplay of these effects during the graphitization process is discussed and a growth model is proposed with a diffusion distance which increases as the reaction proceeds. Graphs. 1 ref. (N8, N1, Fe)

125-N. Interaction of Solutes in Liquid and Solid Solution in Iron. E. T. Turkdogan. *Iron and Steel Institute, Journal,* v. 182, Jan. 1956, p. p. 66-73.

A simple measure of interaction is found to be the ratio of the activity coefficient of solute Y in a ternary solution, iron-X-Y, to that in the parent binary solution, iron-Y, at the same activity of Y. Tables, graphs. 18 ref.
(N12, N14, P12, Fe)

126-N. Diffusion in Iron-Chromium Alloys. (Digest of "Influence of Chromium on the Self-Diffusion of Iron", by P. L. Gruzin; *Doklady akademii nauk SSSR,* v. 100, 1955, p. 65-67.) *Metal Progress,* v. 69, Feb. 1956, p. 126, 128.

Previously abstracted from original. See item 147-N, 1955.
(N1, Fe, Cr)

127-N. Boron in Iron and Steel. G. M. Leak. *Metal Treatment and Drop Forging,* v. 23, Jan. 1956, p. 21-28.

Review of the effect of boron in iron and steel, with particular reference to its influence on hardenability, shows that some fundamental information about the behavior of boron is lacking. Promising theories to explain mechanism of the hardening effect of boron. Graphs, diagrams. 21 ref. (N8 J26, Fe)

128-N. Self-Diffusion of Metals and Associated Phenomena. XI. R. W. Balluffi, F. D. Rosi, and L. L. Seigle. *Sylvania Electric Products Inc. (U. S. Atomic Energy Commission)* ,SEP-153. *Final Progress Report,* Apr. 1954, 9 p.

Structural changes occurring in brass during dezincification. 3 ref. (N1, Cu)

129-N. Silver Migration in Electric Circuits. O. A. Short. *Tele-Tech & Electronic Industries,* v. 15, Feb. 1956, p. 64-65, 110-113.

Conditions under which silver migrates and methods employed to eliminate it. Diagrams, photographs. (N1, T1, Ag)

130-N. Two Level Approach to Cooperative Phenomena. Jerome Rothstein. Paper from "Conference on Magnetism and Magnetic Materials". American Institute of Electrical Engineers, p. 24-37.

A kinetic treatment of order-disorder transitions is applied to ferromagnetism. A quantitative relationship is developed to describe relaxation phenomena in ordered copper-gold and other alloys. Graphs. 20 ref. (N10, N11, P16, Cu, Au)

131-N. Low Temperature Precipitation in Commercial Oriented 3% Silicon Steel. F. S. Gardner. Paper from "Conference on Magnetism and Magnetic Materials". American Institute of Electrical Engineers, p. 100-106.

Mechanism of changes in structure and magnetic properties of transformer steels after prolonged operation at 100 to 200° C. Table, graphs, micrographs. 8 ref. (N7, P16, AY-h)

132-N. Dislocation Movements in a Stress-Relief Anneal and Their Relation to Magnetic Recovery. C. G. Dunn. Paper from "Conference on Magnetism and Magnetic Materials". American Institute of Electrical Engineers, p. 126-130.

Determination of mechanism of relief of stresses with accompanying improvement in magnetic properties. Studies of movement of edge dislocations on slip planes, polygonization and coarsened substructures. Micrographs, graphs, diagram. 17 ref. (N4, M26, J1, AY, Fe)

133-N. Diffusion of Calcium and Silicon in a Lime-Alumina-Silica Slag. Helen Towers and John Chipman. *American Institute of Mining Metallurgical and Petroleum Engineers, Preprint,* 1956, Feb., 13 p.

Two methods for radio-active tracer studies of diffusion in liquid slags investigated. Diffusion constants of calcium and silicon at 1430° C. determined by capillary method. Diagrams, graphs, autoradiograph, microphotometer trace. 8 ref. (N1, N14, B21, Si, Al)

134-N. Solubility of Carbon in Thorium. Robert Mickelson and David Peterson. *Ames Laboratory (U. S. Atomic Energy Commission),* ISC-463, Feb. 1954, 15 p.

Thorium-carbon samples prepared by arc melting sponge thorium with high-purity graphite. X-ray data, hardness readings and metallographic examinations of heat treated specimens were combined to obtain the solubility limits at four temperatures. Micrographs, graphs, tables. (N12, Th)

135-N. Preparation and Inspection of High-Purity Copper Single Crystals. J. H. Wernick and H. M. Davis. *Journal of Applied Physics,* v. 27, Feb. 1956, p. 149-153.

A simple and inexpensive vacuum procedure has been employed to grow copper single crystals by the Bridgman method. Photographs, diagram. 8 ref. (N12, M23, Cu)

136-N. Diffusion and Marker Movements in Beta Brass. Ulf S. Landergren, C. Ernest Birchenall and Robert F. Mehl. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Feb. 1956, p. 73-78

Diffusion coefficients and marker movements determined using welded couples, with three concentration ranges at 750° C. and a fourth at 500, 600, 700 and 800° C. Results favored a vacancy diffusion mechanism Tables, graphs. 15 ref. (N1, Cu, Zn)

137-N. New Intermediate Phase in Burnt Tungsten Steels. Kehsin Kuo. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Feb. 1956, p. 97.

New phase lies between a eutectic of austenite and Fe_3W_3C. It can only form directly from the liquid state by drastic quenching and is a ternary phase of iron, tungsten and carbon. Table, micrograph. 6 ref. (N8, AY)

138-N. Heterogeneous Nucleation of the Martensite Transformation. R. E. Cech and D. Turnbull. *Journal of Metals,* v. 8; *American Insti-*

tute of Mining and Metallurgical Engineers, Transactions, v. 206, Feb. 1956, p. 124-132.

Experiments on powders of an iron-nickel alloy show that the martensite transformation appears to start on heterogeneous nucleation sites. The nature of these sites is hypothesized and a mechanism for burst phenomenon is set forth. Diagrams, micrographs, graphs, tables. 19 ref. (N2, N8, Fe, Ni)

139-N. Comparison of Techniques in a Study of Zinc Self-Diffusion. F. E. Jaumot, Jr., and R. L. Smith. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Feb. 1956, p. 137-142.

Self-diffusion in zinc has been used as an instrument for comparison of the adsorption and sectioning techniques as a means of studying diffusion. Graphs, tables. 19 ref. (N1, Zn)

140-N. Interaction of Precipitation and Creep in Mg-Al Alloys. C. S. Roberts. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Feb. 1956, p. 146-148.

Poor elevated temperature creep resistance results from case of deformation at grain boundaries and the multiplication of these boundaries by discontinuous precipitation. Micrographs, graph. 7 ref. (N7, Q3 Mg Al)

141-N. Occurrence of CsCl-Type Ordered Structures in Certain Binary Systems of Transition Elements. Paul A. Beck, J. B. Darby, Jr., and O. P. Arora. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Feb. 1956, p. 148-149.

Iron-vanadium alloys examined but cesium-chloride-type ordering was not definitely established. Ordering of other systems is discussed. Table. 10 ref. (N10, Fe, V)

142-N. Self-Diffusion in Single and Polycrystals of Zinc at Low Temperatures. F. E. Jaumot, Jr., and R. L. Smith. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Feb. 1956, p. 164-169.

Anomalous results obtained for single crystal samples indicated that in some cases grain boundary diffusion predominated. Volume diffusion coefficients values for either samples were much larger than expected from high-temperature data. Graphs, tables. 11 ref. (N1, Zn).

143-N. Transformation of the TiO Phase. Chih-Chung Wang and Nicholas J. Grant. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Feb. 1956, p. 184-185.

X-ray diffraction studies reveal a transformation taking place in titanium oxide near 925° C. Physical properties before and after are the same. Table, X-ray spectrometer patterns. 2 ref. (N9, Ti)

144-N. Experimental Observations Concerning the Collapse of Dislocation Loops During Annealing. Jack Washburn. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Feb. 1956, p. 189-191.

The *c*-axis indentations in zinc crystals were shown to undergo 100% strain recovery on heating. Observations were consistent with a number of predictions of dislocation theory. Micrographs, diagrams. 1 ref. (N4, M26, J23, Zn)

145-N. Diffusion in Liquid Lead. S. J. Rothman and L. D. Hall. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Feb. 1956, p. 199-203.

Diffusions of lead and of trace amounts of bismuth in liquid lead studied in the temperature range 606 to 930° K. by the capillary method using radio-active tracers. Tables, diagram, graphs. 23 ref. (N1, N14, Pb, Bi)

146-N. Filtering Apparatus for Study of Liquid-Solid Equilibria in Alloy Systems. L. A. Willey. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Feb. 1956, p. 263-264.

Operation and uses of the apparatus. Diagram, graph. 4 ref. (N12, Al)

147-N. Influence of Holes and Electrons on the Solubility of Lithium in Boron-Doped Silicon. Howard Reiss and C. S. Fuller. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers Transactions,* v. 206, Feb. 1956, p. 276-282.

Theoretical and experimental study of those interactions between holes and electrons which influence solubilities of donors and acceptors in semiconductors. Solubility of lithium doped to varying degrees with boron. Graph, diagrams, tables. 12 ref. (N12, Li, B, Si)

148-N. Effect of Stress on the Martensitic Transformation in the Cu-Zn System. E. J. Suoninen, R. M. Genevray and M. B. Bever. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers,*

Transactions, v. 206, Feb. 1956, p. 283.

Quantitative investigation of effect of tensile stresses on transformation. Thermo-elastic behavior of martensite formed early in the transformation. Graphs. 9 ref. (N9, Cu, Zn)

149-N. Mechanisms of Hydrogen Producing Reactions on Palladium. II. Diffusion of Electrolytic Hydrogen Through Palladium. Sigmund Schuldiner and James P. Hoare. *Electrochemical Society, Journal,* v. 103, Mar. 1956, p. 178-181.

Diffusion rate of hydrogen through several thicknesses of palladium for varying current densities was measured. Relationship between diffusion current and total polarizing current was established. Diagram, graphs, table. 10 ref. (N1, Pd)

150-N. Diffusion Short Circuits in Metals. Robert E. Hoffman. *General Electric Review,* v. 59, Mar. 1956, p. 28-31.

Phenomenon of migration of atoms across grain boundaries, how grain boundary diffusion accounts for changes in grain size and affects final properties of an alloy. Photographs, radiograph, micrograph. (N1)

151-N. Diffusion and Oxidation of Metals. M. T. Simnad. *Industrial and Engineering Chemistry,* v. 48, Mar. 1956, pt. II, p. 586-601.

A review of the development in theories, experimental work and techniques. 371 ref. (N1, R2)

152-N. Growth and Some Properties of a Large Single Crystal of Cadmium Selenide. D. M. Heinz and E. Banks. *Journal of Chemical Physics,* v. 24, Feb. 1956, p. 391-398.

Method of growing large single crystals, preparation from pure materials, determination of electrical properties. Diagram, graphs, table. 31 ref. (N12, P15, Cd, Se)

153-N. Thermal Diffusion in Single Crystals of Zinc. F. R. Winter and H. G. Drickamer. *Journal of Chemical Physics,* v. 24, Feb. 1956, p. 492-493.

Diffusion measurements were made on single crystals both perpendicular and parallel to the crystal axis, using traces of thallium, silver and indium impurities. Graphs, table. 4 ref. (N1, Zn, Tl, Ag, In)

154-N. Grain Boundaries. II. Equilibrium Segregation to Grain Boundaries. D. McLean. *Metal Treatment and Drop Forging,* v. 23, Feb. 1956, p. 55-61.

Equilibrium segregation and its control by heat treatment. The thermodynamical theory of the formation of such grain boundaries. Diagram, micrograph, graph. 24 ref. (N1, J27)

155-N. On the Transition Temperatures of Superlattices Au_3Cu and $AuCu_3$. M. Shimoji. *Physical Society of Japan, Journal,* v. 11, no. 1, Jan. 1956, p. 91-92.

Discrepancy of transition temperatures of the solid alloys from that predicted by theory. Proposes an improved theory. 3 ref. (N10, Au, Cu)

156-N. The Transition to Superconductivity. P. R. Doidge. *Royal Society of London, Philosophical Transactions,* v. 248, ser. A, no. 954, Mar. 1956, p. 553-573.

A study of the gradation between the two types of behavior shown by pure and alloyed superconductors in the particular instance of solid solutions of indium in tin. Diagram, graphs, tables. 16 ref. (N11, P15, In, Sn)

157-N. Studies of the Aluminum-Uranium Alloying Reaction. D. W. Bareis. *Brookhaven National Laboratory (U. S. Atomic Energy Commission),* AECD-3795, Dec. 1949, 40 p.

An alloying reaction occurred wherever and whenever clean metallic surfaces of aluminum and uranium were brought into contact within the temperature range from 250 to 450° C. Anodization of the aluminum surface prevented the alloying reaction. Graph, photographs, micrographs, X-ray diffraction patterns, tables. 14 ref. (N1, L19, Al, U)

158-N. Growth Twins in Germanium. G. F. Bolling, W. A. Tiller and J. W. Rutter. *Canadian Journal of Physics,* v. 34, Mar. 1956, p. 234-240 + 4 plates.

Occurrence found to be very markedly dependent upon thermal, constitutional and crystallographic conditions of solidification. In every case, the nucleation of a twin could be traced to a condition of supercooling, either absolute or constitutional, during solidification. Diagrams, micrographs. 10 ref. (N12, N2, Ge)

159-N. Uranium-Zirconium Diffusion Studies. D. R. Mash and B. F. Disselhorst. *Livermore Research Laboratory (U. S. Atomic Energy Commission),* AECD-3701, June 1954, 37 p.

Uranium diffusion into zirconium cladding of clad sheet specimens studied over temperature range from 300 to 1050° C. for times up to

1812 hr. Diagrams, micrographs, tables, graphs. 3 ref. (N1, U, Zr)

160-N. (English.) **A Microstructural Study of the Carbide Phase Changes on Tempering a Molybdenum Steel With 0.11 C and 2.14 Mo.** Kehsin Kuo. *Jernkontorets Annaler,* v. 140, no. 1, 1956, p. 24-46.

Structural changes accompanying conversion of Fe_3C into Mo_2C studied by means of light and electron microscopes. Electron microscope examination made on extracted carbides provided more detailed information concerning this conversion than other methods. Tables, graph, micrographs. 27 ref. (N8, AY)

161-N. (French.) **Temper Hardening of Austenitic Alloys Having Undergone an Intense Cold Working. Probably Intervention of a Disorder→Order Transformation.** Xavier Waché and Emile Josso. *Comptes rendus,* v. 242, no. 4, Jan. 23, 1956, p. 510-512.

Influence of intermediate cold working on temper hardenability in nickel-cobalt-chromium-molybdenum noncarburized complex alloys. Graph. 4 ref. (N8, N10, J29, AY)

162-N. (French.) **Study of Iron-Chromium Alloys Close to Equiatomic Composition.** Gilles Pomey. *Institut de recherches de la sidérurgie, publications,* ser. A, no. 117, Nov. 1955, 165 p.

Preparation of iron-chromium alloys, their properties in the range of solid solutions, and the $\alpha \rightleftarrows \sigma$ transformation. Tables, micrographs, graphs, charts, diagrams. 61 ref. (N8, B22, Fe, Cr)

163-N. (German.) **Changes of Microstructure of Graphite and Cobalt.** A. Kochanovska. *Acta Technica Academiae Scientiarum Hungaricae,* v. 13, nos. 3-4, 1955, p. 421-430.

Physical and physico-chemical property changes, produced by grinding, examined and compared. Graphs, micrographs, table, diagram. (N5, G18, Co)

164-N. (German.) **Martensite Transformation in the System Copper-Zinc.** Guido Bassi and Bengt Ström. *Zeitschrift für Metallkunde,* v. 47, no. 1, Jan. 1956, p. 16-21.

The stability of the β_1-lattice diminishes with increasing copper content, transforming to α by diffusionless translation. With lower copper content β_1 is obtained by the same mechanism of transformation. Additions of lead and bismuth lead to martensite-like structures. Tables, micrographs, phase diagrams, x-ray diffractograms. 13 ref. (N9, Cu, Zn)

165-N. (German.) **Effect of Elastic Stresses on Recrystallization Textures.** Hans Stadelmaier and B. F. Brown. *Zeitschrift für Metallkunde,* v. 47, no. 1, Jan. 1956, p. 1-8.

The anisotropy of the volume energy of a nucleus being stressed elastically during deformation causes a minimum value of the nucleation energy for the cube texture and the [100] fiber-texture. The appearance of the cube texture, depending on degree of deformation, alloying additions, and initial grain size, is closely connected with the strain hardening behavior during deformation. Diagraphs. 32 ref. (N15, Al, Cu, EG-c)

166-N. (German.) **Orientation of Thin Vapor-Deposited Metal Coatings. Investigation by Electron Interferometry.** H. Göttsche. *Zeitschrift für Naturforschung,* v. 11a, no. 1, Jan. 1956, p. 55-68 + 2 plates.

Determination of surface orientation of Ag, Au, Al, Pd and Cu on the 100-surface LiF, NaCl, KCl and KI crystals. Diagrams, tables, micrographs. 32 ref (N15, Al, Cu, EG-c)

167-N. (Italian.) **On the Activation Energy of Interstital Carbon and Nitrogen in Iron Alloys.** Andrea Ferro and Giorgio Montalenti. *Ricerca scientifica,* v. 25, no. 11, Nov. 1955, p. 3069-3081.

After measuring the diffusion of carbon contained in an iron-silicon alloy by magnetic relaxation methods, a theoretical explanation is given of the higher heat of activation shown by carbon and nitrogen atoms diffusing in iron alloys with respect to pure iron. Diagrams, graphs, table. 15 ref. (N1, P12, Fe, CN)

168-N (Russian.) **Study of Certain Physical Processes Occurring on the Surface of a Metal at High Temperature. I. "Natural Roughness" of the Surface of a Semicrystal.** Ia. E. Geguzin and N. N. Ovcharenko. *Izvestiia akademii nauk SSSR, otdelenie teknicheskikh nauk,* 1956, no. 1, Jan. 1956, p. 108-118.

Surface diffusion, interaction of metallic surface with gaseous phase (evaporation and condensation), and other mechanisms figure in the rough step-like or banded accretions or growth of the grain surface. Micrographs, diagrams, 8 ref. (N1, M27, N15, Cu)

169-N. (Russian.) **Hardening of Solid Solutions of Nickel at High Tempera-**

tures. I. I. Kornilov. *Izvestiia akademii nauk SSSR, otdelenie tekhnicheskikh nauk,* 1956, no. 1, Jan. 1956, p. 119-125.

Relation of yield strength of nickel and its alloys and the hardening mutiple to temperature. Effect of chemical composition and number of components. Hardening in relation to distortion of crystal lattice of "solvent-metal". Hardened state preservation at high temperatures is dependent on the degree of saturation of the solid solution. Tables, graphs, 15 ref. (N7, J27, Ni, Cr)

170-N. (Russian.) **Stable Granulation Structure of Cast Steel.** D. K. Butakov. *Stal',* v. 16, no. 1, Jan. 1956, p. 44-50.

This structure reduces mechanical properties and is responsible for cracks and other defects in cast or forged parts. It is the result of the phase transformation delta iron → gamma iron and recrystallization. The stability of the structure can be eliminated by prolonged homogenization and cooling. Micrographs. 16 ref. (N12, N8, N5, CI)

171-N. (Russian.) **The Actual Distribution of Impurities in Crystals by the Drawing Out of the Melt Method and Possibilities of Further Developing the Method.** D. A. Petrov. *Zhurnal Fizicheskoi Khimii,* v. 30, no. 1, Jan. 1956, p. 50-55.

The drawing out of the melt method with the continuous addition to the melt allows bars (monocrystals) to be obtained of constant composition along their entire length. Graphs, diagrams, micrographs. (N12)

172-N. (Russian.) **Structure Formation During Eutectic Cyrstallization of Binary Alloys.** Ia. V. Grechnyi. *Zhurnal Fizicheskoi Khimii,* v. 30, no. 1, Jan. 1956, p. 184-189 + 2 plates.

The primary crystals of the phase, monocrystalline in the eutectic colony, initiate the eutectic transformation. Diagram, micrographs. 11 ref. (N12)

173-N. (Spanish.) **Alpha-Martensite in Cu-Al Beta-Alloys.** Jose Terraza Martorell and Y. Luis Gonzalez Vazquez. *Instituto del hierro y del acero,* v. 8, no. 41, Oct.-Dec. 1955, p. 707-718.

X-ray, micrographic and dilotometric study of martensite structures originating in the tempering of copper-aluminum beta alloys reveals the existence of a martensite phase which extends from the limit alpha/(alpha + beta) up to a concentration of from 11.23 to 11.5% aluminum. Graphs, diagrams, micrographs, radiograms. 30 ref. (N9, Cu, Al)

174-N. (Swedish.) **Formation of Sigma Phase in Stainless Steels.** Henrik Olsson-Werme. *Jernkontorets Annaler,* v. 140, no. 1, 1956, p. 47-74.

A literature survey of the formation of sigma phase in stainless steels and chromium and chromium-nickel steels. Influence of the sigma phase on mechanical properties and metallographic methods for identification of this phase. Graphs, tables, diagrams. 35 ref. (N8, SS, AY)

175-N. Micro-Autoradiography Applied to the Study of the Redistribution of Chromium During a Homogenizing Anneal. I. E. Bolotov and M. I. Gol'dshtein. *Henry Brutcher Translation No.* 3678, 5 p. (From *Zavodskaya Laboratoriya,* v. 21, no. 7, 1955, p. 828-830). Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 371-N, 1955. (N1, J23, ST, Cr)

176-N. Growth Layers Formed in the Reaction of Solid Iron With Liquid Aluminum and Aluminum Alloys. G. Gürtler and K. Sagel. *Henry Brutcher Translation No.* 3680, 9 p. (Abridged from *Zeitschrift Metallkunde,* v. 46, no. 10, 1955, p. 738-741.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 54-N, 1956. (N12, Al)

177-N. (English.) **On the Superstructure of the Ordered Alloy Cu_3Pd. I. Electron Diffraction Study.** Denjiro Watanabe and Shiro Ogawa. *Physical Society of Japan, Journal,* v. 11, no. 3, Mar. 1956, p. 226-239.

Ordered structures of copper-palladium alloys, chiefly of a'', phase were investigated by electron diffraction, using orientated, evaporated films. Diffraction patterns, photographs, tables, diagrams. 16 ref. (N10, M22, Cu, Pd)

178-N. (French.) **Radiocrystallographic Study of the Deformation and "Polygonization" of Iron Monocrystals.** J. Dejace. *Revue Universelle des Mines,* v. 12, ser. 9, no. 2, Feb. 1956, p. 60-64.

Study of the behavior of a network of Armco iron monocrystals deformed by tension and subsequently tempered. Micrographs. 11 ref. (N5, Q24, Fe)

179-N. (German.) **Investigation of Isothermal Austenite-and-Martensite Decomposition of Unalloyed Steels in the Range From 100 to 400° C. by**

Means of Solvent Etching Methods. Hans-Kurt Görlich and Hans Goossens. *Archiv für das Eisenhüttenwesen,* v. 27, no. 2, Feb. 1956, p. 119-126.

Separation of structural constituents for the requirements of electronic microscopy and fine structure tests. Proof for hexagonal ε-iron carbide. Process of transformation of ε-iron carbide into cementite. Determination of the lattice parameters of the hexagonal ε-iron carbide. Tables, graphs, diagram, micrographs, diffractograms. 21 ref. (N8, ST)

180-N. (German.) **Precipitation Phenomena in a Chromium-Nickel Steel Stabilized With Titanium, and Its Relationship to Inter-Crystalline Corrosion.** Karl Bungardt and Gustav Lennartz. *Archiv für das Eisenhüttenwesen* v. 27, no. 2, Feb. 1956, p. 127-133.

Analytical and X-ray investigation of steel with 0.07% carbon, 17.5% chromium, 0.4% molybdenum, 0.013% nitrogen, 10.4% nickel, and 0.47% titanium. Graphs diagram. 10 ref. (N7, R2, AY)

181-N. (German.) **Investigation of Tempering and Growth Structure of Metal Single Crystals With a Field Electron Microscope.** M. Drechsler and R. Vanselow. *Zeitschrift für Krisetallographie,* v. 107, no. 3, Feb. 1956, p. 161-181.

Investigation of tantalum, tungsten and nickel single crystal surfaces. Application of a method based on dislocation energy for determination of growth structures. Tables, diagrams, micrographs. 29 ref. (N12, Ni, Ta, W)

182-N. (German.) **Investigation of Growth Speed Orientation Dependency in Primary Recrystallization of Aluminum Single Crystals.** Bernhard Liebmann, Kurt Lücke, and George Masing. *Zeitschrift für Metallkunde,* v. 47, no. 2, Feb. 1956, p. 57-63.

The rate of growth during the process of recrystallization depends on crystallographic orientation and on direction of prior deformation. Diagrams, graphs. 30 ref. (N5, Al)

183-N. (German.) **Effect of Small Intrusions on the Recrystallization Behavior of High-Grade Pure Aluminum.** Georg Masing, Kurt Lücke and Peter Nölting. *Zeitschrift für Metallkunde,* v. 47, no. 2, Feb. 1956, p. 64-74.

Additions of manganese, zinc and nickel, in amounts of 0.01 at.%, greatly slow down recrystallization. The effect is attributed to foreign atoms dissolved in mixed crystals, which have a tendency to gather at the grain boundaries. Tables, graphs, diagrams, diffractograms. 21 ref. (N5, Al)

184-N. (German.) **Hydrogen Solubility in Aluminum, Lead, and Zinc Melts.** Wilhelm Hofmann and Jürgen Maatsch. *Zeitschrift für Metallkunde,* v. 47, no. 2, Feb. 1956, p. 89-95.

Method and degree of accuracy for determining the gas contents of metals. Tables, graphs, diagrams. 9 ref. (N15, Al, Pb, Zn)

185-N. (Japanese.) **Study on Blowholes in Iron and Steel. II. Composition of Gases in Blowholes.** Takehiko Fujii. *Iron & Steel Institute of Japan, Journal,* v. 42, no. 2, Feb. 1956, p. 94-99.

Equipment and procedures for sampling and analyzing blowhole gases. Mechanism of gas formation and diffusion. Graphs, tables, photographs, diagrams. 7 ref. (N15, S11, Fe, ST)

186-N. (Russian.) **X-Ray Study of Reaction Diffusion in the Copper-Selenium and Copper-Tellurium Systems.** V. I. Arkharov and S. Mardeshev. *Fizika metallov i metallovedenie,* v. 1, no. 2, 1955, p. 281-285.

Comparison of mechanism of diffusion reaction between solid copper and the gaseous phase of selenium or tellurium, with same type of reaction between copper and oxygen or sulfur. Phase composition of scale formed and microstructural features. Photographs, diagram, tables. 7 ref. (N1, I.9, Cu)

187-N. (Russian.) **Theory of Method for Determining Diffusion Coefficient Along Grain Boundaries of Metals.** V. T. Borisov and B. Ia. Liubov. *Fizika metallov i metallovedenie,* v. 1, no. 2, 1955, p. 298-302.

Equations, based on Fisher's model, cover distribution of dissolved substance not only throughout grains of polycrystals, but also on intergranular boundaries, taking into account lattice distortions, local stresses, and the like. Graph. 6 ref. (N1)

188-N. (Russian.) **Effect of Small Additions of Silver or Zinc on the Solubility of Copper in Aluminum.** L. M. Magat and N. I. Noskova. *Fizika metallov i metallovedenie,* v. 1, no. 2, 1955, p. 307-310.

Mechanism of effect of small amounts of dissolved admixtures on kinetics of aging; effect of growth of crystallites and decomposition of supersaturated solid solution. Relation of solubility of copper to temperature, in pure aluminum and

with various additions. Tables, graphs. 4 ref.
(N12, N7, Cu, Al, Ag, Zn)

189-N. (Russian.) **X-Ray Study of the Aging of Aluminum Alloys. III. Use of X-Ray-Goniometric Methods to Determine the Mutual Orientation of Phases. IV. Methods of Calculating and Interpreting the Pictures of Diffusion Scattering.** Iu. A. Bagariatskii. *Fizika metallov i metallovedenie,* v. 1, no. 2, 1955, p. 316-338.

Crystallographic orientation and state of hardening after artificial aging and high-temperature tempering. Formulas derived which make it possible to pass from coordinates of diffusion maximums, measured on the one-dimensional photograph, to the three-dimensional depiction of the reciprocal lattice for cubic crystals. Graphs, diagrams, X-ray diffractograms. 39 ref.
(N7, M23, Al, Cu, Mg)

190-N. (Russian.) **Aging of Aluminum-Copper Alloy.** N. N. Buinov. *Fizika metallov i metallovedenie,* v. 1, no. 2, 1955, p. 339-348.

Different stages of aging are followed by electron micrography. Relation between hardness of alloy and aging time at 190° C. Microstructural peculiarities. Micrographs, graphs. 13 ref.
(N7, Q29, M27, Al, Cu)

191-N. (Russian.) **X-Ray and Electron Microscope Study of the Aging of Alloy Al-Zn.** N. N. Buinov and L. I. Podrezov. *Fizika metallov i metallovedenie,* v. 1, no. 2, 1955, p. 349-358.

Distribution of zones and particles of zinc by size after different time-temperature conditions. Microstructural peculiarities. Micrographs, graphs. 12 ref. (N7, M27, Al, Zn)

192-N. The Effect of Cycling Variables Upon the Growth Rate of 300° C. Rolled Uranium. R. M. Mayfield. *Argonne National Laboratory (U. S. Atomic Energy Commission),* ANL-4905, June 1952, 26 p.

Variables studied include heating and cooling rates, cycling temperature limits, temperature range and holding times at each temperature. Diagram, graphs, photograph, tables. 11 ref. (N3, U)

193-N. Orientations of Large Grains Produced by Strain-Anneal Treatment of High Purity Uranium. E. S. Fisher. *Argonne National Laboratory (U. S. Atomic Energy Commission),* ANL-5075, May 1953, 16 p.

Orientations of 16 large grains, which were produced in a rod of high-purity uranium in an attempt to prepare a single crystal by the strain-anneal method, were determined using back-reflection Laue photograms. Diagrams, graph, micrographs, table. 7 ref. (N5, U)

194-N. Preparation of Alpha Uranium Single Crystals. III. Grain Coarsening Method. E. S. Fisher. *Argonne National Laboratory (U. S. Atomic Energy Commission),* ANL-5021, Final Report, Aug. 1954, 89 p.

Investigation of coarsening in uranium containing a uniformly dispersed inhibitor and the results of introducing an inhibitor gradient. Heat treatments used for preparing single crystals of diameters varying from 0.140 to 0.175 in. from four different materials. Diagrams, graphs, micrographs, photographs, tables. 8 ref. (N12, N3, U)

195-N. Transformation Kinetics of Eutectic Uranium-Chromium Alloy. H. A. Saller, F. A. Rough and A. A. Bauer. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* BMI-869, Sept. 1953, 19 p.

Uranium and eutectic uranium-chromium alloy were studied during heating at rates up to 650 to 780 c.p.s. respectively. Tables, graphs. 3 ref. (N6, Cr, U)

196-N. Inhibition of Grain Growth. (Digest of "The Effect of Aluminum Nitride Precipitation in Relation to Grain Growth in Steels", by A. B. Chatterjea and B. R. Nijhawan; presented at the annual meeting of the Indian Institute of Metals in Jan. 1955, 25 p.) *Metal Progress,* v. 69, Apr. 1956, p. 142-144.

Investigation of various type steels to determine effect of aluminum in grain growth inhibition; theory and explanation is based on aluminum nitride. (N3, N7, ST)

197-N. Stabilization of Metal Carbides by Nonmetallic Elements. Harry H. Podgurski. Paper from "Engineering Research Laboratory 1953-1954". v. I. 1954. E. I. DuPont de Nemours & Company, Wilmington, Del., p. 153-164.

Proposes that both sulfur and oxygen may readily inhibit the decomposition of iron, cobalt and nickel carbides by blocking the nucleation of graphite at the surface of these powder composites. Micrographs, tables. 17 ref. (N8)

198-N. Nucleation-and-Growth Processes in Metals and Alloys. H. K. Hardy and T. J. Heal. Paper from "Symposium on the Mechanism of Phase Transformations in Metals". Institute of Metals. p. 1-46 + 4 plates.

Examples of the thermodynamic-

composition relationships underlying typical nucleation processes are used to show that the initial reaction may always be treated as part of a precipitation process. Current information on the effect of plastic deformation on nucleation processes reveals a field ready for active exploration. Diagrams, graphs, tables. 194 ref. (N2, Q24, Al)

199-N. Superlattice Formation in the Alloy $CdMg_3$. H. Steeple and H. Lipson. Paper from "Symposium on the Mechanism of Phase Transformations in Metals". Institute of Metals. p. 77-85 + 1 plate.

Optical-diffraction method of illustrating the process of superlattice formation in alloys; its application to $CdMg_3$ and some examples of diffraction patterns. Diagrams. 18 ref. (N10, Cd, Mg)

200-N. The $\beta \rightarrow \alpha$ Transformation in Pure Tin and Its Dilute Alloys. E. O. Hall. Paper from "Symposium on the Mechanism of Phase Transformations in Metals". Institute of Metals. p. 87-92 + 1 plate.

Study of the mechanism whereby gray (α) tin disintegrates into small pieces as a result of the volume change on transformation. Diagram, tables. 11 ref. (N6, Sn)

201-N. Sigma-Phase Nucleation and Other Transformations During Diffusion in the Iron-Chromium System. H. J. Goldschmidt. Paper from "Symposium on the Mechanism of Phase Transformations in Metals". Institute of Metals. p. 105-119.

X-ray analysis was used to study the progress of diffusion in powder compacts of iron and chromium for various temperatures, times and compositions. It has been possible to determine in this way the rate of solid-solution formation. Diagram, graphs, tables. 13 ref. (N1, N2, SS)

202-N. Martensitic Transformations. B. A. Bilby and J. W. Christian. Paper from "Symposium on the Mechanism of Phase Transformations in Metals". Institute of Metals. p. 121-172.

Available crystallographic and kinetic data for all transformations of this type reviewed. An account is given of recent theories of the crystallography of martensite, and the assumptions and predictions which they involve are compared. Diagrams, tables. 166 ref. (N8, N9, ST)

203-N. (English.) **Equilibrium of Carbon and Oxygen in Molten Iron Saturated With Carbon.** Sachio Matoba and Shiro Banya. *Technology Reports, Tohoku University,* v. 20, no. 1, 1955, p. 131-141.

Equilibrium relationships determined. Graphs, tables, diagram. 14 ref. (N14, Fe)

204-N. (Czech.) **Contribution to the Question of Brittleness of Transformer Sheets.** Vaclav Rauner and Marcela Zezulova. *Hutnické Listy,* v. 11, no. 3, Mar. 1956, p. 134-139.

Brittleness of transformer sheets is due to the formation of a hard and massive precipitate which occurs mostly in alpha grain boundaries. Cause of this formation described. Tables, micrographs. 11 ref. (N7, N1, Q23, SG-p)

205-N. (Czech.) **About the Morphology of Brittle Constituents in Transformer Sheet Structure.** Jaroslav Jezek. *Hutnické Listy,* v. 11, no. 3, Mar. 1956, p. 139-143.

Concludes that the solution of the nonferrous phase in steel with 4% silicon occurs with the discontinued shifting of the ferrite phase boundary so that parallel zones with variable composition are formed which manifest themselves after the etching. Graph, micrographs. 8 ref. (N7, N12, SG-p)

206-N. (Czech.) **Activation Energy of Viscosity and of Self-Diffusion in Fused Metals.** Antonin Hrbek. *Hutnické Listy,* v. 11, no. 3, Mar. 1956, p. 164-168.

Properties of metals in molten state. Calculation of viscosity and self-diffusion in molten metals at an arbitrary temperature. Table, graphs. 44 ref. (N1, P12)

207-N. (Russian.) **X-Ray Study of Reaction Diffusion in a System of Copper and Sulfur.** V. I. Arkharov and S. Mardeshev. *Fizika Metallov i Metallovedenie,* v. 1, no. 2, 1955, p. 273-280 + 2 plates.

Phase composition of outer, middle and inner layers of scale formed as high-temperature reaction products between a solid metal and a gaseous medium. Microstructure of sulfides formed. Mechanism of corrosion by gas. Tables, X-ray diffractograms, micrographs, photograph. 18 ref. (N1, R9, M27, Cu)

208-N. Kinetics of the Zirconium-Nitrogen and Zirconium-Tin-Nitrogen Systems. M. W. Mallett, J. Belle and B. B. Cleland. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* BMI-829, May 1953, 30 p.

A study in the temperature range of 920 to 1640° C. at 1 atmosphere pressure. The reaction of nitrogen

with zirconium or zirconium-tin alloys follows a parabolic law after an initial induction period. Presence of small amounts of tin as an alloy constituent appears to retard the over-all reaction rate. Graphs, tables. 17 ref. (N15, P13, Sn, Zr)

209-N. Foundry Practice. XI. Heat Treatment. William H. Salmon and Eric N. Simons. *Edgar Allen News,* v. 35, Apr. 1956, p. 82-84.

Crystalline structure of cast copper alloys; stress-relief and annealing; annealing treatments producing malleabe irons. (To be continued.) Table, micrographs.
(N8, J23, J1, CI, Cu)

210-N. Carbide Phase Changes on Tempering a Molybdenum Steel. K. Kuo. *Engineers' Digest,* v. 17, Mar. 1956, p. 95-98. (From *Jernkontorets Annaler,* v. 140, no. 1, 1956, p. 24-46.)

An account of the microstructural changes accompanying the carbide conversion $Fe_3C \rightarrow Mo_2C$, as revealed under optical and electron microscopes. Micrographs. 7 ref.
(N8, J29, M27, AY)

211-N. The Solubility of Graphite in Manganese, Cobalt, and Nickel. E. T. Turkdogan, R. A. Hancock and S. I. Herlitz. *Iron and Steel Institute, Journal,* v. 182, Mar. 1956, p. 274-277.

Solubility determined at various temperatures up to 1700° C. Graphs, table. 34 ref. (N12, Mn, Co, Ni)

212-N. Some Effects of Heat Treatment and Microstructure on the Transition Temperature of a 0.24% Carbon Steel. G. Burns and C. Judge. *Iron and Steel Institute, Journal,* v. 182, Mar. 1956, p. 292-300.

Austenite grain size at the commencement of cooling is a major factor affecting the transition temperature. Cooling rate also has a substantial effect which is more marked during the transformation of the pearlite than in other parts of the cooling range. Graphs, micrographs. 6 ref. (N8, J general, CN)

213-N. Some Defects in Crystals Grown From the Melt. I. Defects Caused by Thermal Stresses. E. Billig. *Royal Society, Proceedings,* v. 235, ser. A, Apr. 10, 1956, p. 37-55 + 8 plates.

Investigation of residual imperfections of crystals formed during their growth from the melt. The crystal is assumed to have solidified in the form of a perfect lattice but to be subsequently deformed by the action of some mechanical stress. Diagram, graphs, photographs, micrographs, table. 23 ref. (N12)

214-N. (French.) **A Study of Polygonization Phenomena and Their Practical Applications.** Jean Talbot. *Chimie & Industrie,* v. 75, no. 3, Mar. 1956, p. 509-518.

The development of micrographic and radiocrystallographic methods has made it possible to observe a new physical state of metals named the polygonized state. Micrographs, photographs, graph, diagrams. 18 ref. (N5)

215-N. (French.) **Kinetics of Precipitation in an Aluminum-Copper Alloy With 4% Copper.** Francois Sebilleau. *Comptes Rendus,* v. 242, no. 11, Mar. 12, 1956, p. 1467-1468.

Application of the method of the displacement of diffraction rays to the study of the evolution of non-homogeneous solid solutions makes it possible to distinguish between the phenomena of pre-precipitation and ordinary precipitation. Graph. 2 ref. (N7, Cu, Al)

216-N. (Polish.) **New Device for Magnetometric Examination of the Kinetic Energy of Martensitic Transformation in Steel at Temperatures Below the Temperature of the Surrounding Medium.** W. Cias. *Prace Instytutow Ministerstwa Hutnictwa,* v. 8, no. 1, 1956, p. 1-16.

Measurement of magnetic saturation of test specimens which increases with the growth of the ferromagnetic phase (martensite). Graphs, diagrams, photographs, micrographs. 57 ref. (N8, P16)

217-N. (Russian.) **Mechanism of Austenite Formation With Rapid Heating.** I. N. Kidin. *Doklady Akademii Nauk SSSR,* v. 106, no. 6, Feb. 21, 1956, p. 1019-1022.

Thermal and dilatometric curves for various heat treated technically pure iron specimens. Manner in which austenite forms along boundaries of mosaic blocks. Microhardness at edge and within ferritic field of steel after heat treatment. Graphs, diagrams. 18 ref.
(N8, Q29, J general, ST)

218-N. (Russian.) **Investigation of the Fine Crystal Structure of the γ-Phase Stabilized by Reversed Martensitic Transition.** Ia. M. Golovchiner and R. A. Landa. *Doklady Akademii Nauk SSSR,* v. 107, no. 1, Mar.-Apr. 1956, p. 67-70.

Relation between variation in crystalline state of γ-phase and its capacity for transformation ($\gamma \rightarrow d$) during and following cooling. Relation between mosaic block sizes and heating temperature after normal and reverse martensitic transformations. Theories as to causes

of stabilization. Role of plastic deformation. Graphs, table. 3 ref. (N8, Q24, AY)

219-N. (Russian.) **Investigations of Certain Physical Processes Occurring on the Surface of a Metal at High Temperature. II. Recrystallization in the Surface Layer of the Metal.** Ia. E. Geguzin and N. N. Ovcharenko. *Izvestiia Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk,* 1956, no. 2, Feb. 1956, p. 3-14.

Experimental study of grain recrystallization kinetics of a polycrystalline specimen of copper. Natural roughness on specimen surface increases grain stabilization time. Relation between thickness of surface layer formed and average grain size. Micrographs, table, graph, diagram. 5 ref. (N5, M27, Cu)

220-N. (Russian.) **Causes of Lowered Properties of Bessemer Steel and Possible Means of Eliminating Them.** P. P. Arsent'ev, S. I. Filippov and V. V. Iakovlev. *Izvestiia Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk,* 1956, no. 2, Feb. 1956, p. 15-25.

Effect of nitrogen, oxygen and carbon (depending on amount) in causing aging, brittleness and unsatisfactory electro-weldability. Microstructural studies reveal phases within ferritic grain. Melting techniques recommended include surface oxygen blowing in the converter and neutralization of harmful impurities. Tables, graphs, photographs. 8 ref. (N7, M27, Q23, K9, ST)

221-N. (Russian.) **Growth of the Carbide Phase During Heat Treatment of Steel.** V. I. Psarev. *Metallovedenie i Obrobotka Metallov,* 1956, no. 2, Feb. 1956, p. 2-8.

Relation between average radius or number of coarsening particles and the period of time of isothermal soaking. Linear character of rate of grain growth. Relation between surface energy at phase boundaries and the "coagulation" process. Effect of alloying elements and temperature. Tables, graph. 8 ref. (N3, N5)

222-N. (Russian.) **Investigation of the Isothermal Annealing of Some Alloy Steels.** E. S. Tovpenets. *Metallovedenie i Obrabotka Metallov,* 1956, no. 2, Feb. 1956, p. 53-56.

Magnometric and microstructural methods of analysis. Effect of austenization temperature; cooling procedure, media, and time; length of soaking. Recommendations for suitable annealing procedures for different steels. Tables, graphs. 3 ref. (N8, J23, AY)

223-N. Preparation of Alpha Uranium Single Crystals. I. Phase Transformation Method. E. S. Fisher. *Argonne National Laboratory (U. S. Atomic Energy Commission),* AECD-3798, Nov. 1953, 39 p.

Method investigated was a modification of the Bridgman technique for growing single crystals from a melt. Description of structures produced by this treatment, summary of indicated effects of variables on the structures. Diagrams, graph, micrographs, photographs. 11 ref. (N12, U)

224-N. Vibration Suppresses Columnar Grain Growth of Aluminum. D. W. Levinson, A. H. Murphy and W. Rostoker. *Light Metal Age,* v. 14, Apr. 1956, p. 24-25.

Some experiments which graphically illustrate the magnitude of this effect. Photographs, table, diagram. 3 ref. (N12, N3, Al)

225-N. Alloying Theory. R. W. Buzzard. *National Bureau of Standards (U. S. Atomic Energy Commission),* NBS-4032, Apr. 1955, 14 p.

Search for valid physical data. It was shown that the ionic parameters may be applied to solubility data for binary alloy systems. An approach to the problem of polyvalent metals on a reasonable basis using precise data was developed. Diagram, graph, tables. (N general)

226-N. (Czech.) **Tempering in Liquid Medium and Gaseous Atmosphere.** Zdenek Hostinsky. *Slévarenstvi,* v. 4, no. 3; *Prace Ceskoslovenského Vyzkumu Slévarenského,* v. 3, no. 29, Mar. 1956, p. 203-212.

Graphitization studies in salt baths and protective atmospheres. Effects of processing factors and composition of the cast iron. Photograph, diagram, micrographs, tables, graphs. 9 ref. (N8, J23, CI)

227-N. (German.) **Diffusion Investigation by Means of Ferromagnetic Suspension.** Karl Torkar and Hans H. Weitzer. *Zeitschrift für Metallkunde,* v. 47, no. 3, Mar. 1956, p. 191-194.

A method by means of which the boundaries between a magnetic and a nonmagnetic area may be made visible with the aid of a magnetic suspension which accumulates at the boundaries during the process of magnetization. The investigation of the diffusion of copper and nickel is given as an example. Photographs, micrographs, graph. 7 ref. (N1, P16, Cu, Ni)

228-N. (German.) **Hardening Effect in Rolled Zinc Alloys.** Erich Pelzel.

Zeitschrift für Metallkunde, v. 47, no. 3, Mar. 1956, p. 195-198.

Cold rolled binary zinc alloys containing low quantities of aluminum, copper, silver and cadmium do not show a hardening effect. In the case of ternary alloys (Zn-Al-Cu, Zn-Cu-Ag, Zn-Ag-Cd, Zn-Cu-Cd) the decrease of hardness by crystal recovery during aging at room temperature is markedly delayed; this is interpreted as an age hardening effect. Graphs, micrographs. 10 ref. (N7, Q24, Zn)

229-N. (German.) **Self-Diffusion in Molten Indium Metal.** A. Lodding. *Zeitschrift für Naturforschung,* v. 11a, no. 3, Mar. 1956, p. 200-203.

Diffusion coefficient "D" of liquid indium determined in the range of 170 to 750° C. by capillary method. Results can be expressed as follows: $D = 28.9X10^{-5}$ exp. $(-2430/RT)$ Table, graph, diagram. 5 ref. (N1, In)

230-N. (Russian.) **Determination of Residual Austenite in High-Speed Steel by the Magnetic Method.** A. I. Gardin. *Zavodskaia Laboratoriia,* v. 22, no. 3, Mar. 1956, p. 303-309.

Carbide-phase content after various heat treatments. Variation of carbide phase in relation to temperatures of quenching and tempering. Equations. Graphs, tables. 4 ref. (N8, M23, J26, J29, TS)

231-N. (Russian.) **Use of Magnetic Method for Studying Phase Transformations in Alloys Having Two Ferromagnetic Phases.** Iu. D. Tiapkin. *Zavodskaia Laboratoriia,* v. 22, no. 3, Mar. 1956, p. 309-311.

Use of nomograms and equations. Variation in magnetic absorption of the given phase with respect to temperature. Martensitic transformations. Graphs. (N8, M23, Fe, Ni)

232-N. (Russian.) **Anisometric Sensitivity and Experimental Error in the Study of Phase Transformations.** K. A. Malinina. *Zavodskaia Laboratoriia,* v. 22, no. 3, Mar. 1956, p. 312, 314.

Determinations of residual austenite. Graphs, tables. 2 ref. (N8, AY)

233-N. (Russian.) **Scale of Microstructures of Martensite.** A. P. Guliaev, A. A. Kolesanova and E. I. Malinkina. *Zavodskaia Laboratoriia,* v. 22, no. 3, Mar. 1956, p. 314-315 and 2 plates.

Use of scale for size and type (e.g., needle-like formations) of martensitic microstructure in determining optimum heating temperatures for induction hardening and other heat treatments. Micrographs, table. (N8, M27, J general, AY)

234-N. (Book.) **Symposium on the Mechanism of Phase Transformations in Metals.** 276 p. 1955. The Institute of Metals, 4 Grosvenor Gardens, London, S. W. 1, England.

Eighteen papers covering austenitic, martensitic and other transformations in ferrous and nonferrous metals and alloys. (N general, Fe, EG-a)

235-N. Sub-Surface Blowholes in Gray Irons and Their Association With Manganese Sulphide Segregation. W. G. Tonks. *American Foundrymen's Society, Preprint No.* 56-23, 1956, 13 p.

Typical examples of the occurrence of sub-surface blowhole defects; experimental work designed to determine and investigate the cause of the trouble. Diagrams, graphs, micrographs, photographs, tables. 6 ref. (N12, CI)

236-N. Effects of Fast Neutron Irradiation on Order-Disorder in Nickel-Manganese Alloys. L. R. Aronin. *Massachusetts Institute of Technology (U. S. Atomic Energy Commission),* MIT-1107, Apr. 1953, 60 p.

Effects of irradiation in a Hanford reactor on a series of alloys ranging from 16.5 to 31.9 at. % manganese were studied by resistivity and magnetic induction measurements. Diagram, tables, graphs. 26 ref. (N10, P15, P16, Ni, Mn)

237-N. Self-Diffusion in Germanium. Harry Letaw, Jr., William M. Portnoy and Lawrence Slifkin. *Physical Review,* v. 102, ser. 2, May 1, 1956, p. 636-639.

An accurate determination of the self-diffusion coefficient was obtained. In the temperature range from 766 to 928° C., it is represented by $D = 7.8$ exp $(-68\ 500/RT)$ cm^2 sec. Graphs, table. 15 ref. (N1, Ge)

238-N. Remarks on the Granulation of Cast Iron. E. M. Onitsch-Modl and R. Mitsche. *Powder Metallurgy Bulletin,* v. 7, Apr. 1956, p. 134-137.

Observations made during the preparation of cast iron granules. Results refer exclusively to cast iron melts obtained in the customary manner in the cupola furnace. Diagram, photographs. (N12, CI)

239-N. (Czech.) **To the Question of Stabilizing Titanium Stabilized Corrosion Resistant Cast 18 Cr, 9 Ni Steels.** Rudolf Pospisil and Rudolf Stefec. *Hutnické Listy,* v. 11, no. 4, Apr. 1956, p. 218-225.

Effect of titanium upon stabilization of 18% Cr, 9% Ni steel against

intercrystalline corrosion is dealt with, keeping in mind that the carbides in cast steel show a different structural distribution than in laminated steel and considering also experiences with welds having the structure of cast steel. Tables, diagram, micrographs. 18 ref. (N8, R2, SS)

240-N. (Japanese.) **Some Observations on Grain Growth Characteristics of Austenite.** Taiji Kawai and Yoshiaki Masuko. *Iron and Steel Institute of Japan, Journal,* v. 41, no. 4, Apr. 1956, p. 435-442.

Change of grain size and growth characteristics during melting and teeming practice; relation between grain size and growth characteristics of a ladle sample and a finished product of the same heat; dependence of characteristics upon the degree of duplication of grains. Tables, graphs. 16 ref. (N3, N12, ST)

241-N. (German.) **Recrystallization Process in Copper Wire.** Otto Nielsen. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 9, no. 4, Apr. 1956, p. 151-158.

Investigation of the effect of inclusions on copper softness. Testing methods, effect of method of production, drawing rate and inclusions. Tables, graphs, diagram, photographs, micrographs. 6 ref. (N5, Cu)

242-N. (Japanese.) **Studies on the Decarburizing Reaction of Molten Fe-C Alloys. III. On the Concentration Dependence of the Specific Rate Constant of the Decarburizing Reaction.** Yoshinobu Katsufuji and Kichizo Niwa. *Iron and Steel Institute of Japan, Journal,* v. 41, no. 4, Apr. 1956, p. 412-416.

Relation between specific rate constant and concentrations of carbon and oxygen in the reactants. Graphs, table. 5 ref. (N14, Fe)

243-N. (Russian.) **On Quasi-Eutectic and Quasi-Eutectoid Structures.** Ia. V. Grechnyi. *Izvestiia Akademii Nauk SSSR, Otdelenie Teknicheskikh Nauk,* no. 3, Mar. 1956, p. 77-91.

Significance of quasi-eutectic areas on a crystallization diagram plotted on the basis of determination of limits of metastability in liquids and of conditions of metastable equilibrium. Graphs. 10 ref. (N12)

244-N. (Russian.) **Analytical Solutions of Simpler Problems of the Solidification of Different-Shaped Casting.** N. G. Girshovich and Iu. A. Nekhendzi. *Liteinoe Proizvodstvo,* no. 4, Apr. 1956, p. 13-17.

Equations for the solidification of cylindrical and spherical castings. Heat conductance and other factors. Graphs. (To be continued). (N12, E25)

245-N. (Spanish.) **Influence of Vanadium on the Susceptibility to Austenitic Grain Growth.** Justo Ferrer Flotats. *Instituto del Hierro y del Acero,* v. 9, no. 44, Mar. 1956, p. 267-274, disc., p. 275-276.

Experimental determination of the law of austenitic grain growth in new steels of different origins, with and without addition of vanadium. Graphs, table, micrographs. 10 ref. (N3, V, ST)

246-N. Preparation of Alpha Uranium Single Crystals. II. Strain-Anneal Method. E. S. Fisher. *Argonne National Laboratory (U. S. Atomic Energy Commission),* ANL-5160 Aug. 1954, 75 p.

Failure to produce single crystals is attributed to strain-relieving mechanisms other than growth of recrystallization nuclei and to inhibition of growth of recrystallization nuclei by high concentrations of dispersed particles. Tables, micrographs, photographs, graphs. 10 ref. (N12, N5, U)

247-N. Isothermal Transformation Diagram for a Silicon-Chromium Steel. C. J. Osborn. *Australasian Engineer,* Feb. 1956, p. 63-64.

Preparation and use of diagram for type SAE 9254 steel. Graph. 5 ref. (N8, AY)

248-N. Single Crystals of Exceptional Perfection and Uniformity by Zone Leveling. D. C. Bennett and B. Sawyer. *Bell System Technical Journal,* v. 35, May 1956, p. 637-660.

The zone-leveling process was developed into a simple and effective tool, capable of growing large single crystals having high lattice perfection and containing an essentially uniform distribution of one or more desired impurities. Experimental work with germanium. Graphs, photographs, diagrams, tables. 17 ref. (N12, Ge)

249-N. Kinetics of Solidification. K. A. Jackson and Bruce Chalmers. *Canadian Journal of Physics,* v. 34, May 1956, p. 473-490.

The kinetic theory of melting and freezing is developed from consideration of atom movements at an interface between solid and liquid. Diagram, tables, graphs. 11 ref. (N12)

250-N. Austenitic Manganese Steel. Effect of Heat Treatment on Metallography and Mechanical Properties.

K. J. Irvine and F. B. Pickering. *Iron & Steel,* v. 29, Apr. 1956, p. 135-139.

Quantitative metallographic study of the transformation characteristics for heating times up to 24 hr. Table, micrographs, graphs. (To be concluded.) (N8, AY)

251-N. Diffusion of Donor and Acceptor Elements in Silicon. C. S. Fuller and J. A. Ditzenberger. *Journal of Applied Physics,* v. 27, May 1956, p. 544-553.

Method based on change in conductivity through the penetration layer used to measure diffusion of boron and phosphorous; *p-n* junction method was used for other elements of Groups III and V. Photographs, tables, diagrams, graphs. 19 ref. (N1, Si)

252-N. Theory of Order-Disorder Kinetics. George H. Vineyard. *Physical Review,* v. 102, ser. 2, May 15, 1956, p. 981-992.

Problem of relating fundamental atom movements to the change of the state of order of an alloy is attacked in a basic manner by introducing an infinite array of distribution functions for the occupation of all possible sets of lattice sites. Graphs. 24 ref. (N10)

253-N. (English.) **An Isothermal Anneal Study of Quenched and Cold-Worked Copper-Palladium Alloys.** F. E. Jaumot, Jr., and A. Sawatzky. *Acta Metallurgica,* v. 4, no. 2, Mar. 1956, p. 118-126.

Ordering probably takes place by a nucleation and growth process. Growth of ordered domains is a singly activated process with activation energies in the range from 34 to 46 kcal per mol., depending on composition and condition of the sample. Tables, graphs. 7 ref. (N10, N2, Pd, Cu)

254-N. (English.) **Order-Disorder and Cold-Work Phenomena in Cu-Pd Alloys.** F. E. Jaumot, Jr., and A. Sawatzky. *Acta Metallurgica,* v. 4, no. 2, Mar. 1956, p. 127-144.

When disordered copper-palladium alloys are cold worked at room temperature, electrical resistivity decreases, magnetic susceptibility increases, temperature coefficient of resistivity decreases and the thermoelectric power becomes increasingly negative. Table, graphs. 18 ref. (N10, Cu, Pd)

255-N. (English.) **Cementite Morphology in Pearlite.** F. C. Frank and K. E. Puttick. *Acta Metallurgica,* v. 4, no. 2, Mar. 1956, p. 206-210.

Characteristic growth patterns of cementite in pearlite, revealed by electron microscopy, discussed in terms of the geometry of growth and of diffusion and surface energy factors. Micrographs, diagrams. 2 ref. (N8, ST)

256-N. (English.) **On the Coarsening of Non-Sag Tungsten Lamp Filament Wires.** Sunao Ogni. *Physical Society of Japan, Journal,* v. 11, no. 5, May 1956, p. 593-598.

To make clear the nonsag nature of tungsten lamp filament, its recrystallization behavior was studied by means of microscopy and X-ray diffraction. Photographs, graph, micrographs, diffractograms. 9 ref. (N5, W)

257-N. (Czech.) **Contribution to the Mechanism of the Effect of Alloying Elements Upon the Eutectoid Reaction.** N. T. Gudcov and Josef Cadek. *Hutnické Listy,* v. 11, no. 4, Apr. 1956, p. 199-207.

Shows that the formation of cementite-containing pearlite is organically connected with segregation of tungsten in austenite. The cementite need not necessarily be an active nucleus of the eutectoid reaction even in cases where it forms (together with tungsten carbide) one of the stable carbide phases of a given steel. Tables, graph, diagrams. 5 ref. (N8, AY)

258-N. (German.) **Observations of Graphite Formation in Hypo-Eutectic Cast Iron.** Adalbert Wittmoser and Eduard Houdremont. *Archiv für das Eisenhüttenwesen,* v. 27, no. 4, Apr. 1956, p. 241-257.

Structural investigation of chilled untreated or magnesium hypoeutectic treated cast iron in the temperature range of 1350 to 1100° C. Table, graphs, diagrams, micrographs, photographs. 57 ref. (N8, CI)

259-N. (German.) **Time Regularities of Eutectoid Transformation.** Bernhard Ilschner. *Archiv für das Eisenhüttenwesen,* v. 27, no. 4, Apr. 1956, p. 275-280.

Hypothesis of lamination order and nucleus formation. Fundamentals of uncontrolled and hindered growth. Calculation of ratio regularities. Graphs, diagrams, micrograph. 14 ref. (N8)

260-N. (German.) **Contribution to the Study of the Iron-Nitrogen System.** Wolfgang Pitsch and Eduard Houdremont. *Archiv für das Eisenhüttenwesen,* v. 27, no. 4, Apr. 1956, p. 281-284.

Nitriding of carbonyl iron in an ammonia-hydrogen mixture. Deter-

mination of nitrogen in ferrite, by means of microhardness measurements. Calculation of diffusion values. Table, graphs, diagram, micrograph. 10 ref. (N1, Q29, J28, Fe)

261-N. (German.) **Relation Between $CuAl_2$ Structure and Separation Lattice of Aluminum-Copper Alloys.** Ulrich Dehlinger and Hans Pfleiderer. *Zeitschrift für Metallkunde,* v. 47, no. 4, Apr. 1956, p. 229-231.

The *O*-structure of $CuAl_2$ meets theoretical requirements. Diagram. 12 ref. (N9, Al, Cu)

262-N. (Italian.) **Separation From Supersaturated Mixed Crystals.** F. Bollenrath. *Metallurgia Italiana,* v. 48, no. 4, Apr. 1956, p. 141-152; disc., p. 152.

Isothermal evolution, with time, of the separation of supersaturated mixed crystals in some cast irons, steels and aluminum alloys. Aging curves examined as far as they follow the time law proposed by Wert and Zener; other aspects are explored. Tables, graphs, micrographs. 13 ref. (N7, AY, CI, Al)

263-N. (Japanese.) **Study of Heat-Resisting Steels—VII.** Eiichiro Asano. *Iron & Steel Institute of Japan, Journal,* v. 41, no. 5, May 1955, p. 524-531.

Influence of temperature and time on age hardening during solution treatment. All samples, solution-treated under different conditions, were aged at 800° C. (1470° F.) and hardness was measured from 1 to 200 hr. Graphs, photographs, table. 7 ref. (N7, J27, ST)

264-N. A Discussion of the Phase Composition of Ball Bearing Steel and Its Measurement. Donald P. Koistinen. *General Motors Engineering Journal,* v. 3, May-June 1956, p. 10-13.

Research studies provide new empirical formula, derived from quantitative X-ray diffraction data, for calculating retained austenite. Graphs, table, micrograph. 6 ref. (N8, ST)

265-N. Austenitic Manganese Steel. Effect of Heat Treatment on Metallography and Mechanical Properties. K. J. Irvine and F. B. Pickering. *Iron and Steel,* v. 29, May 1956, p. 169-170.

Tensile properties and work hardening characteristics. Micrograph, graphs. 6 ref. (N8, Q23, J26, AY)

266-N. The Effect of Gravity in the Solidification of Steel. B. Gray. *Iron and Steel Institute, Journal,* v. 182, Apr. 1956, p. 366-374.

Macrostructures obtained in a series of vertically cast, bottom-poured steel ingots with different feeding arrangements. Table, diagrams, photographs. 12 ref. (N12, M28, D9, ST)

267-N. Thermodynamics of Carbon Dissolved in Iron Alloys. V. Solubility of Graphite in Iron-Manganese, Iron-Cobalt, and Iron-Nickel Melts. E. T. Turkdogan, R. A. Hancock, S. I. Herlitz and J. Dentan. *Iron and Steel Institute, Journal,* v. 183, May 1956, p. 69-72.

Manganese increases graphite solubility in iron while cobalt and nickel decrease it. Graphs, tables. 17 ref. (N12, P12, Fe, Co, Ni)

268-N. A Reconciliation of Certain Recovery Properties in Metals. A. J. Kennedy. *Journal of the Mechanics and Physics of Solids,* v. 4, May 1956, p. 162-166.

A variety of time and temperature functions proposed to express the mechanical and electrical properties of metals can be reconciled with the behavior of a particular kind of physical model built up from relaxation-type elements. Graph. 18 ref. (N4)

269-N. The Strain-Age Hardening of Mild Steel. B. B. Hundy. *Metallurgia,* v. 53, no. 319, May 1956, p. 203-211.

Effects of strain aging on mechanical properties; a modification of the dislocation theory of strain aging to cover the change in strength and ductility during aging. Table, micrographs, graphs. 40 ref. (N7, CN)

270-N. (Czech.) **Contribution to the Study of Austenite Transformations During Slow Cooling.** Bohdan Sestak. *Hutnické Listy,* v. 11, no. 5, May 1956, p. 299-307.

Dilatometric method for determination of austenite transformation diagram during continuous cooling. A new specimen mounting enables quenching at any moment during the test. Tables, graphs, diagrams, photographs, micrographs. 13 ref. (N8, M23, ST)

271-N. (French.) **Dilatometric Study of Specimens of Cast Iron Intended for the Fabrication of Enameled Pieces.** Pierre Détrez. *Fonderie,* no. 123, Apr. 1956, p. 151-156.

Investigates graphitic effect of silicon, the antigraphitic effect of manganese and the effect of these two elements on variations of the transformation point of cast iron. Tables, graphs. 4 ref. (N8, L27, CI)

272-N. (French.) **The Aging of Steel.** George D'Huart. *Metallurgie,* v. 88, no. 4, Apr. 1956, p. 339, 341, 343, 345.

Changes in mechanical properties of steel as a result of hardening, measured by tensile, hardness and impact tests. Aging by quenching and by deformation. Graphs, photographs. 1 ref. (N7, Q general, ST)

273-N. (French.) **Heterogeneities of a Beta-Brass Containing Aluminum (Study by X-ray Diffraction).** A. R. Weill. *Revue de Métallurgie,* v. 53, no. 2, Feb. 1956, p. 111-121.

Two factors contribute to great brittleness; presence of γ phase, which persists even after quenching from 800° C. upwards, and a very heterogeneous polygonization which exists more particularly in quenched samples. Micrographs, tables, diffractograms. 18 ref. (N6, Q23, Cu)

274-N. (French.) **Contribution to the Study of Carbon and Nitrogen Diffusion in Alpha-Iron, by Internal Damping Measurement.** L. Guillet and B. Hocheid. *Revue de Métallurgie,* v. 53, no. 2, Feb. 1956, p. 122-130.

Measurements allow determination of activation heat involved during diffusion. For annealed, cold worked and aged probes, carbon and nitrogen cannot be lower than 6.10^{-4}%. Diagrams, graphs. 19 ref. (N1, Q8, P12, Fe)

275-N. (French.) **Migration of Grain Boundaries During Creep. Mechanism of Migration.** D. McLean. *Revue de Métallurgie,* v. 53, no. 2, Feb. 1956, p. 139-146.

Speeds of sliding and migration vary differently with change in temperature. Migration of grain boundaries involves diffusion along the grains. Table, diagrams, graphs. 26 ref. (N3, Q3)

276-N. (French.) **Transformation of Iron-Chromium Alloys Near the Equiatomic Composition.** Gilles Pomey and Paul Bastien. *Revue de Métallurgie,* v. 53, no. 2, Feb. 1956, p. 147-159; disc., p. 160.

Two types of transformation; influence of order formation on physical properties. Table, graphs, micrographs. 23 ref. (N8, Fe, Cr)

277-N. (French.) **A Test for the Determination of Metallographic and Ionic Characteristics of Pearlitic Gray Iron, Through Anodic Oxidation.** André Roos. *Revue de Métallurgie,* v. 53, no. 3, Mar. 1956, p. 170-178.

Determination of diffusion coefficients for various alloys, variation of diffusion coefficients. Photographs, micrographs, tables, graphs, diagrams. 7 ref. (N1, L19, CI)

278-N. (French.) **A Study of Aluminum-Magnesium Alloys.** A. Saulnier. *Revue de Métallurgie,* v. 53, no. 4, Apr. 1956, p. 285-296; disc., p. 296-297.

Effects of quenching, hardening and silicon on structure. Graph, tables, micrographs, diffractogram. 9 ref. (N7, J26, Al, Mg)

279-N. (French.) **A Contribution to the Study on Purification of Iron and Determination of Its Transformation Points.** Christian J. Boulanger. *Revue de Métallurgie,* v. 53, no. 4, Apr. 1956, p. 311-319.

Certain treatments in hydrogen or vacuo, between 1400 and 1500° C., enable removal of most metalloid impurities and complete elimination of inclusions. Micrographs, diagrams. 23 ref. (N6, Fe)

280-N. (Russian.) **Carbide Phases Formed During Tempering of Hardened Steel.** B. A. Apaev. *Doklady Akademii Nauk SSSR,* v. 107, no. 5, Apr. 1956, p. 685-688.

Study of the low-temperature modification of the Fe_xC carbide in tempered steel. Discusses the phase composition of steel tempered at various temperatures with respect to the three basic carbide phases. Graphs. 19 ref. (N8, J29, ST)

281-N. **Beta Transus Determination of 3-Mn Complex Titanium Alloy Extrusion.** H. C. Turner. *Convair, Report No.* 8711, Feb. 1955, 6 p.

The upper beta transus temperature was between 1400 and 1450° F. Micrographs, diagram, table. (N11, Ti)

282-N. **The Solid Solubilities of Tin, Indium, and Cadmium in Aluminium.** L. E. Samuels. *Institute of Metals, Journal,* v. 84, May 1956, p. 333-336 + 2 plates.

The use of mechanical polishing to reveal the finest optically resolvable precipitates in a metallographic examination is found superior to electrolytically polished specimens. Photographs, graphs. 14 ref. (N12, M21, Sn, In, Cd, Al)

283-N. **Transformations in Disordered Gold-Copper Alloys.** G. C. Kuczynski, M. Doyama and M. E. Fine. *Journal of Applied Physics,* v. 27, June 1956, p. 651-655.

By measurement of the specific heat, temperature coefficient of expansion, Young's modulus and yield point, it was established that the Cu_3Au alloy undergoes a phase transition between 550 and 600° C. and possibly another one near 850° C. Table, graphs. 18 ref. (N10, Au, Cu)

284-N. **Precipitation Phenomena in Supersaturated Solid Solutions.** A.

Guinier. *Journal of Metals,* v. 8, May 1956, p. 673-682.

Sequence theory of precipitation, physical and X-ray evidence for the precipitation stage, nature of the zones. Diagrams, graphs, photographs, micrograph, diffractograms. 48 ref. (N7)

285-N. Diffusion of Nitrogen in Iron. Paul E. Busby, Donald P. Hart and Cyril Wells. *Journal of Metals,* v. 8, May 1956, p. 686-687.

Diffusion in α-iron studied by fractional saturation method. Resulting diffusion coefficients are in excellent agreement with the values obtained from internal friction experiments. Graph, table. 13 ref. (N1, Fe)

286-N. Self-Diffusion in Solid Nickel. R. E. Hoffmann, F. W. Pikus and R. A. Ward. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, May 1956, p. 483-486.

Self-diffusion coefficient was measured over the range from 870 to 1248° C. Measured activation energy correlates satisfactorily with absolute melting point, heat of fusion and heat of sublimation. Tables, graphs. 16 ref. (N1, P12, Ni)

287-N. Evaluation of the Structural Stability of Ti-Mo-V Alloys. W. F. Carew, F. A. Crossley and H. D. Kessler. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, May 1956, p. 491-496.

Metastable β alloys in the titanium-rich corner of the system were studied in the temperature range from 300 to 550° C. Metallographic examination coupled with hardness measurements were employed to follow structural changes. Graphs, micrographs, diagrams. 13 ref. (N6, V, Mo, Ti)

288-N. Measurement of Grain Growth Rates in Recrystallization. C. D. Graham, Jr., and R. W. Cahn. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, May 1956, p. 504-508.

The rate of growth of a single grain growing into a strained aluminum single crystal, measured by the conventional heat-cool-etch technique, is shown to decrease with time at temperature. X-ray measurements found it to be linear. Diagrams, graphs, photograph. 20 ref. (N5, N3, Al)

289-N. Precipitation Hardening in a Ti-Cu Alloy. L. M. Howe, E. Saarema and J. Gordon Parr. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, May 1956, p. 512-513.

Powder specimens were readily susceptible to age-hardening treatments. Graphs. 4 ref. (N7, Ti, Cu)

290-N. Grain Boundary Mobilities in High Purity Silver. W. E. Bron and E. S. Machlin. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions;* v. 206, May 1956, p. 513-514.

Grain boundary migration in V-shaped thin specimens studied. Micrograph. 5 ref. (N3, Ag)

291-N. Grain Growth Rates and Orientation Relationships in the Recrystallization of Aluminum Single Crystals. C. D. Graham, Jr., and R. W. Cahn. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, May 1956, p. 517-521.

Growth rates are found to be insensitive to orientation, except that new grains with orientations similar to the matrix or to a twin of the matrix have very low mobilities. Diagrams. 40 ref. (N3, N5, Al)

292-N. Phase Transformations in Titanium-Rich Alloys of Nickel and Titanium. D. H. Polonis and J. Gordon Parr. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, May 1956, p. 531-536.

The decomposition of a completely retained β phase and of a completely transformed β phase in a 6% alloy was followed by X-ray diffraction and metallographic methods and by hardness determinations made during the process. Graphs, phase diagram, micrographs. 14 ref. (N6, Ni, Ti)

293-N. Influence of Boron on the Rate of Transformation of High Purity Iron. M. E. Nicholson. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, May 1956, p. 551-553.

The effect of boron on the austenitic transformation rate of iron is smaller than on low-carbon steels. The influence of austenitizing temperature on boron-iron alloys is the reverse of its influence on steels. Graph. 11 ref. (N8, B, Fe)

294-N. Pressure-Temperature-Composition Relations in the Cr-N Termi-

nal Solid Solution. A. U. Seybolt and R. A. Oriani. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, May 1956, p. 556-562.

The partial molal heat of solution, the activity of nitrogen in solid solution and the partial molal free energy were computed. Micrographs, graphs, tables, diagrams. 12 ref. (N12, Cr)

295-N. Solute Diffusion in Nickel-Base Substitutional Solid Solutions. R. A. Swalin and Allan Martin. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, May 1956, p. 567-572.

Diffusion rates of manganese, aluminum, titanium and tungsten in nickel measured at temperatures between 1100 and 1300° C. Tables, graphs. 16 ref. (N1, W, Ti, Al, Mn, Ni)

296-N. Evidence for Solidification of a Metastable Phase in Fe-Ni Alloys. R. E. Cech. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, May 1956, p. 585-589.

Body-centered-cubic-phase nucleates from the liquid in small particles of a 29.5% nickel-70.5% iron alloy. Diagram, micrographs, graphs. 4 ref. (N12, Fe, Ni)

297-N. Sigma Nucleation Times in Stainless Steels. G. F. Tisinai, J. K. Stanley and C. H. Samans. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, May 1956, p. 600-604.

The times at which the first detectable amount of σ phase forms at temperatures between 900 and 1800° F. were determined. Both X-ray diffraction and metallography were used to detect σ in highly strained filings; metallography alone to detect it in annealed bulk samples of stainless steels. Tables, graphs. 12 ref. (N2, SS)

298-N. Heat Evolved and Volume Change in the Alpha-Sigma Transformation in Cr-Fe Alloys. Howard Martens and Pol Duwez. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, May 1956, p. 614.

Standard thermal analysis experiments were performed on heating specimens of σ at the rate of approximately 40° C. per sec. A definite thermal arrest was observed at 870° C. indicating that the reverse reaction of α into σ is exothermic. Graphs. 4 ref. (N6, P11, P12, Cr, Fe)

299-N. (English.) **The Growth of Dispersed Precipitates in Solutions.** G. W. Greenwood. *Acta Metallurgica,* v. 4, no. 3, May 1956, p. 243-248.

Approximate formulas derived are capable of predicting growth rates of the correct order of magnitude. Tables, diagram, graphs. 13 ref. (N7, N12)

300-N. (English.) **Closed Miscibility Gaps in Ternary and Quaternary Regular Alloy Solutions.** J. L. Meijering and H. K. Hardy. *Acta Metallurgica,* v. 4, no. 3, May 1956, p. 249-256.

Spinodal equation of quaternary regular solutions derived and the co-ordinates of second-order critical points given as a function of the six binary interaction parameters. Diagrams, table. 17 ref. (N12, M24)

301-N. (English.) **Mechanism of Whisker Growth. III. Nature of Growth Sits.** S. S. Brenner and G. W. Sears. *Acta Metallurgica,* v. 4, no. 3, May 1956, p. 268-270.

A mechanism for formation of whiskers on a crystal which is growing by vapor deposition. A necessary condition is the existence of diffusion-limited transfer of material or heat. Diagrams, 8 ref. (N12, N15, M26)

302-N. (German.) **Mechanics and Kinetics of Martensite Formation Without Diffusion.** H. Knapp and U. Dehlinger. *Acta Metallurgica,* v. 4, no. 3, May 1956, p. 289-297.

Empirical results with martensite exclude nucleation owing to fluctuations, though the curve of distortion energy per mole including the interfacial energy, tends to infinity with decreasing nuclear size. Diagrams, graphs. 27 ref. (N8, N9)

303-N. (English.) **A Crystallographic Study of Mercuric Iodide.** J. B. Newkirk. *Acta Metallurgica,* v. 4, no. 3, May 1956, p. 316-330.

Crystals grow from the liquid or vapor state by the spread of successive parallel layers over the crystal surface. They also sublime and melt by the recession of layers. Graphs, diagrams, micrographs, diffractograms. 14 ref. (N12, N15, M26)

304-N. (French.) **Various Remarks on the Formation of Uranium Monoxide.** J. Williams and K. H. Westmacott. *Revue de Métallurgie,* v. 53, no. 3, Mar. 1956, p. 189-204 disc., p. 204.

Suggests that uranium mononitride and monocarbide operate as catalyzers in the formation of monoxide; growth of the monoxide film can be explained by the diffusion of the uranium ion in both oxides. Diagram, micrographs. 17 ref. (N16, N1, L14 U)

305-N. (German.) **Structure and Magnetic Properties of Permanent Magnet Alloys During Isothermal Age-Hardening. I. Growth of Particles, Critical Particle Size and Coercivity.** Eginhart Biedermann and Eckart Kneller. *Zeitschrift für Metallkunde,* v. 47, no. 5, May 1956, p. 289-301.

Process of particle growth in several copper-nickel-iron alloys determined as a function of annealing time by means of examination by X-ray and electron microscope. Tables, micrographs, diagrams, graphs, diffractograms. 34 ref.
(N7, P16, J27, Cu, Ni, Fe, SG-n)

306-N. Rates of Surface Self-Diffusion Over the Principal Planes of a Single Crystal of Copper. Norman Hackerman and Norman H. Simpson. *Faraday Society, Transactions,* v. 52, May 1956, p. 628-633.

Diffusion coefficients were found to be of the order of 10^{-5} but differed measurably on the three planes as well as along different axes of the (100) plane. (N1, Cu)

307-N. Solidification of Steel. B. Gray. *Iron and Steel Institute, Journal,* v. 29, June 1956, p. 235-239.

Effects of gravity on crystal growth. (N12, CI)

308-N. Theory of the Sputtering Process. Don E. Harrison, Jr., *Physical Review,* v. 102, ser. 2, June 15, 1956, p. 1473-1480.

Mathematical methods of neutron diffusion theory applied to the problem of cathode sputtering.
(N15, L25)

309-N. The Metallographic View. Metallography of Carburized Cases. XXIII. H. E. Bover. *Steel Processing,* v. 42, June 1956, p. 331-332.

Effect of retained austenite, susceptibility of alloy steels, prevention methods. (N8, J28, ST)

310-N. (German.) **Calculation of Diffusion Processes at Changeable Temperatures.** Bernhard Ilschner. *Archiv für das Eisenhüttenwesen,* v. 27, no. 5, May 1956, p. 337-342.

Derivation of diffusion equations for changeable temperature. Effect of preheating time in isothermal investigations. (N1)

311-N. (German.) **The Influence of Certain Elements on the Formation of Nodular Graphite in Cast Iron.** Johann Verelst and Albert De Sy. *Giesserei,* v. 34, no. 12, June 1956, p. 305-315.

Influence of aluminum, copper, lead and bismuth in the presence of traces of titanium. Theoretical considerations regarding growth of graphite nodules in gray cast iron, mechanism of diffusion and distribution of interfering elements, and the interference mechanism itself. (N8, E25, CI)

312-N. (German.) **On the Mechanism of Crystallization of Graphite in Hypereutectoid Iron.** E. Feil. *Giesserei,* v. 43, no. 12, June 1956, p. 315-318.

Chemical examination of principal components of graphite. Metallographic investigation of graphite and phosphide formation. Types of graphite formation. Tables, micrographs. 5 ref. (N8, M general, CI)

313-N. (German.) **Relations Between Temperature and Time in the Process of Hardening a Molybdenum-Vanadium-Tungsten High-Speed Steel.** Karl Bungardt and Rudolf Oppenheim. *Stahl und Eisen,* v. 76, no. 11, May 31, 1956, p. 689-699; disc., p. 699-700.

Effect of quenching, temperature and time on the carbide solution, grain growth, content of residual austenite, hardness, resistance to temper brittleness, impact bending toughness and cutting power in rough and finish machining. Relations between carbide solution, grain growth and impact bending toughness.
(N8, N3, Q general, J26, G17, AY)

314-N. (Russian.) **Study of the Structure of Steels 30 KhMA and Kh(ShKh-15) After the Bainitic Transformation.** L. S. Palatnik and B. A. Leont'ev. *Fizika Metallov i Metallovedenie,* v. 2, no. 1, 1956, p. 43-53.

Bainitic transformation, which has traits in common with the perlitic and martensitic transformations, consists of three processes: oriented precipitation of supersaturated ferrite; enriching surrounding austenite with carbon and formation of carbides; and tempering of supersaturated ferrite. (N8, AY)

315-N. (Russian.) **Effect of Internal Stresses Due to Phase Transformation Brought About by Low-Temperature Treatment on the Martensite Start (M_s) Temperatures of High-Speed Steel.** P. M. Iushkevich. *Fizika Metallov i Metallovedenie,* v. 2, no. 1, 1956, p. 54-56.

Cyclic tempering treatments, with soaking at 560 and 580° C. and cooling down to 0 and −40° C., to eliminate retained austenite and stress. Hardening, tempering temperatures, soaking times and other factors in relation to M_s temperatures.
(N8, J29, J26, J1, TS-m)

316-N. (Russian.) **Problem of the Rate of Diffusion of Phosphorus in Steel.**

V. N. Svechnikov and S. S. Golubev. *Fizika Metallov i Metallovedenie,* v. 2, no. 1, 1956, p. 88-92 + 2 plates.

Effect of various heat treatments and the temperature and time factors involved, including soaking time and rate of cooling. Phosphorus and carbon redistribution in relation to alpha and gamma phase temperature range. (N1, J general, CN)

317-N. (Russian.) **The Influence of the Alpha-Phase on the Quality of Stainless Sheets.** R. P. Radchenko. *Stal',* v. 16, no. 5, May 1956, p. 450-452.

To avoid formation of considerable amounts of alpha-phase in ingots, which accounts for surface flaws on slabs and sheets, ingots should not be heated above 1250° C. and without overheating individual faces and edges. (N8, F23, SS)

318-N. (Ukrainian.) **On Distribution of Certain Additives in Welded Joints.** Rossoshyns'kyi. *Dopovidi Akademii Nauk, Ukrains'koi RSR,* 1956, no. 2, p. 137-139.

Experimental data on distribution of carbon, phosphorus, nickel, manganese and chromium in the cross section of butt-welded steel joints. The grain boundaries are enriched in carbon, chromium and phosphorus, but not in nickel and manganese. (N12, N1, K1, ST)

319-N. Allotropic Modification of Calcium. J. F. Smith, O. N. Carlson and R. W. Vest. *Electrochemical Society, Journal,* v. 103, July 1956, p. 409-413.

X-ray diffraction patterns show that 99.9% calcuim exists in only two allotropic forms: face centered cubic to 464°C. and body-centered cubic from 464°C. to the melting point. (N6, Ca)

320-N. Equilibrium Diagrams and Single Crystal Growth. Samuel Zerfoss. *Science,* v. 124, July 6, 1956, p. 9-13.

Compositions on a typical binary phase equilibrium diagram are related to growth from the melt by the crucible, the withdrawal and the flame fusion methods. (N12, M24)

321-N. Dilatometric Studies of Zirconium and Zirconium-Tin Alloys Between 25 and 1100° C. R. W. Balluffi, R. Resnick and A. J. Timper. *Sylvania Electric Products, Inc. (U. S. Atomic Energy Commission),* SEP-90, June 1952, 13 p.

A volume decrease occurred in all alloys as a result of the alpha-to-beta transformation in contrast to the expansion predicted by available X-ray data. (N6, M23, Zr, Sn)

322-N. (English.) Observation of Bainite Transformation by Hot-Stage Microscope. Kazuo Tsuya. *Journal of Mechanical Laboratory (Japan),* v. 1, 1955, p. 1-9.

Points where bainite transformation differs from pearlite and martensite transformation were observed. (N8, ST)

323-N. (English.) **Age-Hardening of Titanium-Iron Alloys.** Susumu Yoshida, Hidehiko Yoshida, Takashi Araki and Yuko Tsuya. *Journal of Mechanical Laboratory (Japan),* v. 1, 1955 p. 10-13.

Hardness increases occurring in low-temperature aging are largely attributed to precipitation of the omega intermediate phase. (N7, Ti, Fe)

324-N. (English.) **The Surface Relief Effect Due to Bainite Transformation Observed by Hot Stage Microscope.** Kazuo Tsuya and Tetsutaro Mitsuhashi. *Journal of Mechanical Laboratory (Japan),* v. 1, 1955, p. 42-48.

Relief markings due to bainite formation grow slowly and the rate of growth increases as the transformation temperature increases. (N8)

325-N. (French.) **New X-Ray Observations of Pre-Precipitation Phenomena In Al-Zn-Mg Alloy With 7% Zn and 3% Mg.** René Graf. *Comptes rendus,* v. 242, no. 24, June 11, 1956, p. 2834-2836.

Phenomena are due to sphere-shaped zones coherent with the matrix. This "cold hardening" takes place up to 100° C. whereas "hot hardening", characterized by precipitation of $MgZn_2$, bigins at 50° C. (N7, Al, Zn, Mg)

326–N. (French.) **Research on the Kinetics of Martensitic Transformation.** J. Philibert. *Institut de Recherches de la Sidérurgie, Publications,* ser. A, no. 139, May. 1956, 98 p. + 10 plates.

Study is conducted on two hypereutectoid steels and a ferro-nickel. The problem of "germination" of the martensite and the problem of stabilization of residual martensite are investigated. (N8, AY, Fe)

327-N. (French.) **Study of the Appearance and Stability of the Polygonized State in Pure Iron and Aluminum Crystals.** Ch. de Beaulieu. *Institut de Recherches de la Sidérurgie, Publications,* ser. A, no. 132, Apr. 1956, 42 p.

New properties of very pure iron and aluminum; polygonization as a function of purity. (N5, Q general, Fe, Al)

328-N. (French.) **The Effect of Gravity in the Solidification of Steel.** B. Gray. *Revue de Métallurgie,* v. 53, no. 5, May 1956, p. 379-387.

Macrostructures obtained in vertically cast, bottom-poured steel ingots with different feeding arrangements. The presence of convection currents had a powerful effect on the resulting structures. The hypotheses advanced are applied to the problem of heterogeneity in horizontal castings and to cases for which there has been no generally accepted mechanism. (N12, D9, M28, ST)

329-N. (Japanese.) **Some Aspects of Grain Growth Characteristics of Austenite in Coarse-Grained Steels.** Yoshiaki Masuko. *Iron & Steel Institute of Japan, Journal,* v. 42, no. 6, June 1956, p. 482-489.

Conclusions presented regarding grain size control in steels for high-pressure and high-temperature piping service. (N3, ST)

330-N. (Japanese.) **Study on the High Speed Tools. XVII.** Hideji Hotta and Itsuro Tatsukawa. *Iron & Steel Institute of Japan, Journal,* v. 42, no. 6, June 1956, p. 495-498.

Influence of austenitizing temperatures, between 1260 and 1350° C. on behavior in austempering at the intermediate region 200 to 400° C. and subsequent tempering, was studied by micrography and hardness tests on a high speed steel. (N8, J26, TS-m)

331-N. (Russian.) **Growth in Gray Cast Iron.** F. N. Tavadze and I. A. Bairamashvili. *Liteinoe Proizvodstvo,* 1956, no. 5, May 1956, p. 15-18.

Experimental data on the qualitative and quantitative influence of graphitization and oxidation on the growth in gray cast iron. (N3, CI)

332-N. (Russian.) **The Influence of Alloying Components on the Kinetics of Graphitization in White Cast Iron.** M. A. Krishtal. *Liteinoe Proizvodstvo,* 1956, no. 5, May 1956, p. 18-20.

A study of the influence of alloying elements on the graphitization rate and the mobility of matrix atoms in the austenite of cast iron. (N8, CI)

333-N. (Russian.) **Oxygen Content in Oxygen-Treated Cast Iron.** N. A. Voronova. *Liteinoe Proizvodstvo,* 1956, no. 5, May 1956, p. 23-26.

Thermodynamic calculation and experimental determination of solubility of oxygen in cast iron. (N12, CI)

334-N. (Russian.) **Structural Transformations in Cast Iron During Welding.** P. S. Elistratov. *Metallovedenie i Obrabotka Metallov,* 1956, no. 4, Apr. 1956, p. 10-14.

Effect of welding temperatures and heating and cooling rates on structure of the weld zone. (N8, N5, K1, CI)

335-N. (Russian.) **Role of Intercrystalline Components in the Formation of Hot Cracks in Welded Seams.** V. A. Toropov. *Metallovedenie i Obrabotka Metallov,* 1956, no. 4, Apr. 1956, p. 45-50 + 2 plates.

Effect of carbon, silicon, sulphur and phosphorus on formation of hot cracks and on mechanical properties of welded seam. Role of carbide eutectic in relation to hardness and strength. (N8, Q23, Q29, K1, AY)

336-N. (Russian.) **Magnetic Control of the Hardening and Annealing Qualities of Ball and Roller Bearing Parts.** M. N. Mikheev, G. S. Tomilov, M. F. Pomukhin, K. G. Rziankin and V. A. Utkina. *Zavodskaia Laboratoriia,* v. 22, no. 5, May 1956, p. 549-555.

Device for differential measurement of magnetic properties of steel parts tested for permissible residual austenite content and for proper heat treatment. (N8, Q23, P16, ST)

337-N. (Spanish.) **Variation of the Transformation Temperatures of S. A. E. 52100 Steel.** Enrique D. Bia. *Instituto de Ensayo de Materiales,* Montevideo, Publication No. 29, Boletin de la Facultad de Ingenieria, v. 5, no. 12, Mar. 1956, 12 p.

Determination of the effect of varying the heating and cooling cycles on the transformation temperatures. (N8, AY)

338-N. Solid Solubility of Lithium in Aluminum. S. K. Nowak. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, May 1956, p. 553-556.

The lithium solubility limit in solid aluminum determined by micrographic techniques. Micrographs, graphs, tables. 8 ref. (N12, Li, Al)

339-N. Metal Atom Migration Recorded on Film. R. E. Hoffman. *Industrial Photography,* v. 5, July 1956, p. 24-25, 49.

X-ray film exposed to radioactive silver shows movement of atoms along grain boundaries in study into structure of metals. (N1, S19)

340-N. Structural Changes During the Fatigue of Some Aluminium Alloys. T. Broom, J. H. Molineux and V. N. Whittaker. *Institute of Metals,*

Journal, v. 84, June 1956, p. 357-363, + 2 plates.

Alloys of good static and fatigue strength must possess a metallurgical structure in which a stable dispersion is combined with a matrix containing sufficient solute atoms of a suitable kind to confer strain-aging properties. (N7, Q7, Al)

341-N. The Structure and Growth of Oxide Layers Formed on Beryllium. I. S. Kerr and H. Wilman. *Institute of Metals, Journal,* v. 84, June 1956, p. 379-385 + 1 plate.

Data on the oxidation of abraded, vacuum-condensed and electropolished beryllium surfaces, heated in air. (N15, L13, L19, Be)

342-N. Applications of the Phenomenological Theories of Martensite. I. Geometrical Treatment. II. Related Types of Martensitic Transformation. J. W. Christian. *Institute of Metals, Journal,* v. 84, June 1956, p. 386-398.

Almost all known martensitic transformations may be reduced to either or both of two types in which the twinning plane, or plane of the lattice invariant strain, is respectively a (110) or a (111) plane of a suitable orthorhombic cell of the product lattice. (N8, N9)

343-N. X-Ray Study of the Local Atomic Arrangement in Partially Ordered Cu_3Au. D. R. Chipman. *Journal of Applied Physics,* v. 27, July 1956, p. 739-746.

The atomic arrangement present in a single crystal in a state of equilibrium partial long-range order was investigated by measuring with X-ray techniques the short-range order existing below critical temperature. (N10, Au, Cu)

344-N. Formation of *p-n* Junctions in Semiconductors by the Variation of Crystal Growth Parameters. Henry E. Bridgers. *Journal of Applied Physics,* v. 27, July 1956, p. 746-751.

The Burton fluid transport theory for the variation of the effective distribution coefficient with growth rate and stirring applied to the growth of semiconductor crystals from a melt containing both donor and acceptor impurities. (N12)

345-N. (French.) **Possibilities of Studying Structural Transformations by Cinemicrography at Variable Temperatures.** P. Azou and A. Kerleroux. *Métaux Corrosion-Industries,* v. 31, no. 369, May 1956, p. 244-249.

Study of the precipitation of carbides in unstabilized 18-8 stainless steel during heating from room temperature to 800° C., and also in a 25-20 stainless steel. (N7, M23, SS)

346-N. (German.) **Investigations of Recrystallization of Low-Alloy Aluminium Materials During Hot and Cold Working.** W. Rosenkranz. *Aluminium,* v. 32, no. 7, July 1956, p. 390-397.

The behavior of the manganese-containing alloy $AlMg_2$ during extrusion and subsequent cold working has been studied to provide information about alloy composition and processing conditions. (N5, Al)

347-N. (German.) **Investigation of Kinetics of Martensite Formation.** Heinrich Beisswenger and Erich Scheil. *Archiv für das Eisenhuttenwesen,* v. 27, no. 6, June 1956, p. 413-420.

Device for measuring fast transformation processes. Electrical resistance measurement in irreversible iron-nickel alloys. Increase of reversibility time by means of deformation. (N8, N9, Fe, Ni)

348-N. (German.) **Carbon in Nonferrous Metals. III. Carbon Content in Copper and in Copper Alloys.** J. Fischer and W. Schmidt. *Zeitschrift für Erzbergabau und Metallhüttenwesen,* v. 9, no. 6, June 1956, p. 284-288.

Literature data on solubility of carbon in copper is reviewed. Original measurements described and findings tabulated. (N12, C, Cu)

349-N. (Italian.) **The Measurement of Elastic Modulus and Internal Friction as Methods for Studying the Kinetics of Recrystallization of Aluminum.** T. Federighi and F. Gatto. *Alluminio,* v. 25, no. 6, June 1956, p. 279-285.

A study of the kinetics of the isothermic recrystallization process of aluminum by the elastic modulus, measured dynamically and the internal friction. (N5, Q21, Q22, Al)

350-N. (Spanish.) **Study of the Isothermal Transformation of Austenite in Nine Hypereutectoid Chromium-Nickel Steels.** Benjamin Estruch Subirana. *Instituto del Hierro y Acero,* v. 9, no. 45, Apr. 1956, p. 432-462.

Experimental study of the decomposition of austenite at subcritical temperatures in regions in the TTT diagram. From the results a critical study is made of the various theories that exist to explain the kinetics of the reaction. (N8, AY)

351-N. (Spanish.) **Decomposition of Austenite During Gradual Tempering.** Benjamin Estruch Subirana. *Instituto del Hierro y del Acero,* v. 9, no. 46, May 1956, p. 595-617.

Effect of time of holding test

pieces at a determined subcritical temperature on the course of decomposition of the austenite at a lower temperature, both temperatures being in the same temperature zone of the corresponding TTT diagram. (N8, ST)

352-N. (Swedish.) **Diffusion in the Cu-Zn System.** Ulf Landergren. *Jernkontorets Annaler,* v. 140, no. 6, 1956, p. 401-424.

Recent data on self-diffusion and chemical diffusion in copper, zinc, alpha and beta brass, and beta-prime brass, as well as grain boundary diffusion of zinc in copper. Probable mechanisms are suggested. (N1, Cu, Zn)

353-N. Electrolytic Deposition and Diffusion of Lithium Into Magnesium. J. Smolinski. *Journal of Applied Chemistry,* v. 6, Apr. 1956, p. 180-186.

Lithium diffused into the cathode to form a β-phase magnesium-lithium alloy to a depth of 1.5 mm. (N1, Li7, Li, Mg)

354-N. Determination of Diffusivities in Liquid Metals by Means of Temperature-Gradient Zone Melting. J. H. Wernick, *Journal of Chemical Physics,* v. 25, July 1956, p. 47-49.

Liquid alloys of Ge-Al, Ge-Au, and Si-Al were studied by this new technique. (N1, Ge, Al, Au, Si)

355-N. Influence of Adsorbed Films on Crystal Growth Kinetics. Gerald W. Sears. *Journal of Chemical Physics,* v. 25, July 1956, p. 154-159.

Growth steps are inoperative or poisoned below a critical supersaturation. (N12)

356-N. Some Crystallographic Characteristics of Ordered $MgCd_3$ in Relationship to Its Anomalous Thermal Equilibration at Low Temperatures. W. E. Wallace, R. S. Craig and T. D. Brotherton. *University of Pittsburgh, (U. S. Atomic Energy Commission),* NYO-6329, Jan. 1956, 13 p.

Measurements indicate that the axial ratio is frozen below 281° K. but varies with temperature at higher temperatures. (N10, Mg, Cd)

357-N. (French.) **Heat Resistant Low Alloy Steels and Their Heat Treatment.** G. Delbart and A. Constant. *Métaux, Corrosion-Industries,* v. 31, no. 370, June 1956, p. 251-264.

Heat treatment as it affects strength and the formation of precipitates. Role of carbide precipitates formed during the treatment, effects of the fineness of precipitates, secondary hardening. (N7, Q23, J general, SS-h)

358-N. (German.) **Recrystallization Texture of Highly Deformed Brass Wire.** *Zeitschrift für Metallkunde,* v. 47, no. 6, June 1956, p. 379-382.

The amount of (100) increases with the deformation. The level of deformation at which (100) exceeds (111) goes up with the zinc content. (N5, Q24, Cu)

359-N. (German.) **Intermediary Structure Improvement of Copper During Recrystallization.** Heinz Borchers and Alfred Schafer. *Zeitschrift für Metallkunde,* v. 47, no. 6, June 1956, p. 382-389.

The process of growing is interrupted by quick intermediate refining of the structure, followed by a prolonged period of crystal growth. (N5, Cu)

360-N. (German.) **The Tendency of Partially Recrystallized α-Brass to Grain Growth.** Richard Ergang. *Zeitschrift für Metallkunde,* v. 47, no. 6, June 1956, p. 389-396.

During a certain intermediate stage when it has partly recrystallized, Ms63 brass tends to discontinuous grain growth. If the sheet is deformed by 10 or 20%, substantial formation of coarse grains may occur locally after annealing at 580° C. for 40 min. Ms72 does not show this tendency. (N3, N5, Q24, Cu)

361-N. (German.) **Recrystallization Graphs of Ms63.** Ernst Fischer and Hugo Vosskühler. *Zeitschrift für Metallkunde,* v. 47, no. 6, June 1956, p. 397-401.

Attention is drawn to the relations between hardness and the physical properties found by tensile tests on Ms63 brass. (N5, Q27, Q29, Cu)

362-N. (German.) **Certain X-Ray Observations During Hardening of a Copper-Beryllium Alloy.** Guido Bassi. *Zeitschrift für Metallkunde,* v. 47, no. 6, June 1956, p. 417.

During the process of precipitation the cubic face-centered lattice of the α-phase temporarily becomes tetragonal face-centered. (N7, Cu, Be)

363-N. (German.) **Effect of Stresses and the Phenomenon of Transformation Plasticity in the β1-β″ Transformation of Brass.** Erhard Hornbogen and Günter Wassermann. *Zeitschrift für Metallkunde,* v. 47, no. 6, June 1956, p. 427-433.

The influence on the martensite conversion process exercised by uniaxial tensile and compressive stress was followed for an alloy containing 60.8% copper. (N9, Q25, Cu)

364-N. (Russian.) **The Effect of Overheating of Liquid Steel on Its Crystallization.** D. S. Kamenetskaia, I. B. Piletskaia and E. P. Rakhmanova. *Fizika Metallov i Metallovedenie,* v. 2, no. 2, 1956, p. 254-258 + 1 plate.

The effect of overheating of liquid steel on its cast grain size in the absence of active foreign particles and soluble admixtures as well as in the presence of soluble and insoluble admixtures. Results seem to prove a common applicability of a general crystallization law to both organic and inorganic substances and low and high melting metals and alloys. (N12, ST)

365-N. (Russian.) **Recrystallization Parameters in Induction Heating.** Ts. N. Rafalovich. *Fizika Metallov i Metallovedenie,* v. 2, no. 2, 1956, p. 259-269.

Determination of grain germination and grain growth rate in cold worked low-carbon steel, in rapid induction heating and in relatively slow heating. (N5, J2, CN-g)

366-N. (Russian.) **Obtaining Single Crystals of Desired Orientation From Molten Aluminum.** D. E. Ovsienko and E. I. Sosnina. *Fizika Metallov i Metallovedenie,* v. 2, no. 2, 1956, p. 270-276.

A study of the orienting effect of mica on the growth of aluminum crystals and of the influence of the crystal growth rate on orientation. Method and apparatus for growing single crystals in vacuum. (N12, Al)

367-N. (Russian.) **Stabilization of Austenite at Temperatures Beyond the Martensite Transformation Range.** K. A. Malyshev, N. A. Borodina and V. A. Mirmel'shtein. *Fizika Metallov i Metallovedenie,* v. 2, no. 2, 1956, p. 277-284.

Isothermal treatment of austenite at temperatures above that of the beginning of the martensite transformation may result both in an increase and a decrease in the stability of austenite depending on which of the two processes, stabilization or destabilization, is predominating (N8)

368-N. (Russian.) **Use of Isotope Tracers in the Study of the Phenomenon of Internal Adsorption at the Boundary Between the Al-Ag Allov and the Oxidation Film.** V. I. Arkharov, A. F. Gerasimov, and P. L. Gruzin. *Fizika Metallov i Metallovedenie,* v. 2, no. 2, 1956, p. 294-302.

An experimental study of the concentration of silver in the subsurface layers of alloys covered with an oxidation film, and of the part played by the internal adsorption in this phenomenon.
(N1, M23, R2, Al, Ag)

369-N. (Russian.) **On the Determination of the Activation Energy of Diffusion Processes.** M. A. Krishtal. *Fizika Metallov i Metallovedenie,* v. 2, no. 2, 1956, p. 303-308.

Deals with the possibility of determining the limiting link of complex diffusion processes from the magnitude of their activation energy computed with the aid of the exponential equation expressing the temperature dependence of the velocity of reaction diffusion processes. A suitable method of calculation is offered. (N1, P13)

370-N. (Russian.) **A Study of the Diffusion of Boron and Carbon Into Certain Metals of the Transition Group.** G. V. Samsonov and V. P. Latysheva. *Fizika Metallov i Metallovedenie,* v. 2, no. 2, 1956, p. 309-319 + 1 plate.

Radiographic and chemical analyses, as well as microhardness measurements, show that the diffusion is of the reaction type. Activation energy is found to increase with the atomic number of the metallic component. (N1, B, C)

371-N. (Russian.) **Solidification of Ingots and Castings.** N. T. Gudtsov and B. B. Guliaev. *Vestnik Akademii Nauk SSSR,* v. 26, no. 5, May 1956, p. 22-28.

Historical development of the theory of crystallization in ingots. Special attention given to the gradual crystallization theory. (N12)

372-N. (Russian.) **Use of Autoradiography in the Study of Intercrystalline Liquation in Steel.** I. E. Bolotov, M. I. Gold'shtein, A. A. Popov and A. B. Fedorov. *Zavodskaia Laboratoriia,* v. 22, no. 6, June 1956, p. 682-688.

A study of the liquation of sulfur, phosphorus and tungsten in steel by autoradiography with the aid of radioactive isotopes of these elements. Influence of the cooling rate during crystallization.
(N12, M23, ST)

373-N. (Russian.) **On Methods of Studying Autodiffusion in Tungsten.** V. P. Vasil'ev and S. G. Chernomorchenko. *Zavodskaia Laboratoriia,* v. 22, no. 6, June 1956, p. 688-691.

Measurement technique. The activation energy is the highest known in metals with the exception of bismuth. (N1, P13, W)

374-N. Crystal Growth and Lattice Defects. W. Dekeyser. Paper from

"Defects in Crystalline Solids". Physical Society, p. 134-142.

Brief review of work on growth following the Frank mechanisms and polytypism growth producing spiral pits, dissolution and etching and growth of silver chloride on sodium chloride and its relation with epitaxy. (N12, M26)

375-N. Kinetics of Precipitation in Aluminium Silver Alloys. G. Borelius. Paper from "Defects in Crystalline Solids". Physical Society, p. 169-174.

Microscopic and X-ray analysis, calorimetric and resistometric measurements. (N7, Al, Ag)

376-N. Structure and Anisotropy of Diffusion in Grain Boundaries. R. Smoluchowski. "Defects in Crystalline Solids". Physical Society, p. 197-202.

Highest anisotropy occurs at the lowest angles at which any grain boundary diffusion is observed and it decreases to zero at the highest angle of disorientation. Penetration at a cusp orientation depends upon the density of atoms of misfit. (N1)

377-N. Gases in Iron and Steel. Norman A. Parlee. *Foundry,* v. 84, Aug. 1956, p. 80-87.

Review of behavior of various gases in metals, dealing largely with mechanisms by which gases get into and come out of metals. (N15, N16, Fe, ST)

378-N. Formation and Tempering of Martensite in 18-8 Steels. Paul G. Bastien and Jacques M. B. Dedieu. *Iron and Steel Institute, Journal,* v. 183, July 1956, p. 254-259.

Martensite obtained by simple cooling and by plastic straining, processes involved in tempering 18-8 steels transformed by cold work, effect of heat treatment on the hardness of transformed steels. (N8, J29, SS)

379-N. Bainitic Retained Austenite. J. A. Cameron. *Iron and Steel Institute, Journal,* v. 183, July 1956, p. 260-267.

A dilatometric study of the effects of temperature and time on the decomposition of bainitic retained austenite in En 40C steel. Effect of conditioning on mechanical properties. Occurrence in other B.S. En steels. (N8, Q general, AY)

380-N. Some Experiments on the Composition of Carbides in Low-Alloy Steels. J. E. Bowers. *Iron and Steel Institute, Journal,* v. 183, July 1956, p. 268-274.

Variations in carbide composition in a series of six low-alloy steels investigated as a function of temperature of isothermal transformation, using X-ray and chemical methods. (N8, AY)

381-N. The Interdiffusion of Uranium and Aluminium. A. D. LeClaire and I. J. Bear. *Journal of Nuclear Energy,* v. 2, June 1956, p. 229-242.

Measurements of the width, as a function of temperature and pressure, of the diffusion zone formed by the interdiffusion of uranium and aluminum and of the relative penetration of uranium into aluminum and of aluminum into uranium. (N1, U, Al)

382-N. Cast Structure of High-Speed Steel. E. Ineson and G. Hoyle. *Metal Treatment and Drop Forging,* v. 23, July 1956, p. 257-262.

Causes and effects of the formation of coarse cellular carbides in high speed steels, elimination of the problem considered. (N2, TS)

383-N. Marker Movement in Scale Layers. K. Sachs. *Metallurgia,* v. 54, no. 321, July 1956, p. 11-17.

Nickel and copper markers, in the form of electrodeposits and wires of various thicknesses, were placed on the surface of mild steel specimens which were subsequently oxidized at 900° C. During oxidation thick wires moved outward, very thin markers moved inward and intermediate sizes occupied intermediate positions. (N1, R2, ST)

384-N. Concentration Changes in Retained Austenite. N. F. Lashko. *Henry Brutcher, Translation No.* 3718, 10 p. (From *Zhurnal Tekhnicheskoi Fiziki,* v. 24, no. 5, 1954, p. 884-888.) Henry Brutcher, Altadena, Calif.

Evidence shows that the austenite-to-martensite transformation is not "diffusionless" and the austenite is not retained, but is formed through interaction with the surroundings. X-ray data included. (N8, J22, ST)

385-N. (Polish.) **Using Radioactive Isotopes to Study the Diffusion of Metal.** Zygmunt Jasiewicz. *Hutnik,* v. 23, no. 4, Apr. 1956, p. 163-167.

Various procedures for study of diffusion — the absorption method, based on penetration of the isotope into the depths of the sample; the thin layer method, based on the change in intensity of radiation after diffusion heating of a thin plate; the thick layer method, based on the asymptotic character of the intensity of radiation-period of the diffusion curve. (N1)

386-N. (Russian.) **The Significance of the Resistance of the Medium in the Graphitization of Cast Iron.** A. F. Landa. *Liteinoe Proizvodstvo,* no. 6, June 1956, p. 21-23.

Data indicate that the graphitization process is controlled not only by diffusion of the carbon, but also by the solution of the carbides, the graphite growth and the resistance of the metal base to plastic deformation. (N8, N1, Q24, CI)

387-N. Trace-Element Effects in Some Precipitation-Hardening Aluminium Alloys. H. K. Hardy. *Institute of Metals, Journal,* v. 84, July 1956, p. 429-439.

The response to aging of a range of aluminum-copper, aluminum-copper-lithium, and aluminum-lithium alloys in the absence and presence of 0.1% cadmium was used to determine whether trace-element effects in precipitation reactions are specific to certain precipitates. (N7, Al, Cd, Cu, Li)

388-N. A Consideration of the Changes and Mechanisms Involved During the Annealing of Cold Worked Metals. M. Deighton. *Institute of Metals, Journal,* v. 84; *Institute of Metals Bulletin,* v. 3, July 1956, p. 93-97.

Suggests that recovery is due to interaction of dislocations of opposite sense, that polygonization is a stress-induced process occurring during deformation and that recrystalization in situ is a growth of these subgrains. (N4, N5, Q24, J23)

389-N. On the Dislocation Theory of Evaporation of Crystals. N. Cabrera and M. M. Levine. *Philosophical Magazine,* v. 1, 8th ser., no. 5, May 1956, p. 450-458.

Theory of the steady state spiral, taking account of the strain energy around the dislocation. (N16)

390-N. A Sensitive Technique for Studying Phase Transformations. A. N. Alfimov. *Research,* v. 9, Aug. 1956, p. 302-305. (Translated from the Russian by R. Hardbottle.)

A thermomagnetic apparatus which has been developed for the study of phase changes in steel. (N8, ST)

391-N. The Temperature of Formation of Martensite and Bainite in Low-Alloy Steels; Some Effects of Chemical Composition. W. Steven and A. C. Haynes. *Iron and Steel Institute, Journal,* v. 183, Aug. 1956, p. 349-359.

Empirical formulae were derived relating composition and certain transformation temperatures. (N8, AY)

392-N. The Bainite Transformation. R. E. Hehemann and A. R. Troiano. *Metal Progress,* v. 70, Aug. 1956, p. 97-104.

Published information about this solid-state reaction and the resulting metastable phase has been critically reviewed and assessed in the light of recent findings. (N8, ST)

393-N. Solid Solutions and Grain Boundaries. B. L. Averbach, M. Cohen, M. Hillert, R. Kaplow and A. Schogel. *Massachusetts Institute of Technology Department of Metallurgy (U. S. Atomic Energy Commission),* NYO-7052, Sept. 1955, 3 p.

Report progress in the measurements of short range order and of the so-called Huang effect. (N10, Cu, Pt)

394-N. Fundamentals of Cold Working and Recrystallization. B. L. Averbach and M. Cohen, S. Ailen, M. F. Comerford, C. Houska and L. Mager. *Massachusetts Institute of Technology Department of Metallurgy (U. S. Atomic Energy Commission),* NYO-7077, Sept. 1955, 3 p.

Short-range order as a function of annealing temperature; structure of bent and annealed zinc crystals; imperfections and the martensitic transformation in CoNi Alloys; recovery and recrystallization in α brass. (N5, N9, Cu, Ni, Co, Zn)

395-N. Effect of Temperature of Liquid Steel Upon Ingot Structure. A. P. Pronov. *Henry Brutcher, Translation No.* 3776, 8 p. (From *Izvestiya Akademii Nauk SSSR, OTN,* no. 4, 1955, p. 58-62.) Henry Brutcher, Altadena, Calif.

Structure of ingot interior as affected by ingot dimensions and temperature of sinkhead metal is shown by a longitudinal section through a five-ton steel ingot. (N12, D9, AY)

396-N. Effect of Stress Upon the Aging of a Ternary Nickel, 20% Cr, 2.5% Ti Alloy. V. A. Parfenov. *Henry Brutcher, Translation No.* 3734, 6 p. (From *Metallovedenie i Obrabotka Metallov,* v. 1, no. 4, 1955, p. 16-19.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original See item 85-N, 1956. (N7, M27, Q25, Ti, Cr, Ni)

397-N. (English.) **Dendrites and Growth Layers in the Electrocrystallization of Metals.** Gösta Wranglén. *Acta Polytechnica Chemistry Including Metallurgy Series),* v. 4, no. 11, 1955, 41 p.

Electrodeposited dendrites show a simple relation to the space lattice. Metals of low overvoltage grow by the lateral extension of layers, about

μ thick. Inhibition increases the thickness and number of growth layers but decreases their rate of flow. (N12, L17, Sn, Pb, Ag, Cu, Cd)

398-N. (Russian.) **Structural Features of Ni-Al Alloys in the Decomposition Process of a Supersaturated Solid Solution of Aluminum in Nickel.** Iu. A. Bazariatskii and Ire. D. Tiapkin. *Doklady Akademii Nauk SSSR,* v. 108, no. 3, May 21, 1956, p. 451-454 + 1 plate.

X-ray study of aging of annealed aluminum alloys with a high nickel content. Structural heterogeneity of monophase solid solutions. (N7, Ni, Al)

399-N. (Russian.) **Crystallization of Liquid Steel Under Pressure.** P. N. Bidulia, I. I. Bobrov and K. N. Simirnova. *Liteinoe Proizvodstvo,* 1956, no. 7, June 1956, p. 1-4.

Equipment and methods. Advantages in comparison with ordinary cast and rolled steels. (N12, CI, ST)

400-N. (Russian.) **Formation of Pearlite in Ferritic Ductile Cast Iron.** K. I. Vashchenko and N. A. Golovan. *Liteinoe Proizvodstvo,* 1956, no. 7, June 1956, p. 14-18.

Pearlite formation is conditioned by phosphides concentrated at the boundary between the decarburized zone and the base metal. (N8, CI)

401-N. The Solid Solubility of Uranium in Thorium and the Allotropic Transformation of Thorium-Uranium Alloys. Wendell B. Wilson, Alfred E. Austin and Charles M. Schwartz. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* BMI-1111, July 1956, 12 p.

Determination of the transition temperature, effect of uranium on the transition temperature, solubility of uranium in thorium as a function of temperature. (N12, N6, U, Th)

402-N. Internal Friction and Grain Boundary Viscosity of Copper and of Binary Copper Solid Solutions. L. Rotherham and S. Pearson. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, sec. 2, Aug. 1956, p. 881-892.

Measurements were made of the variation of internal friction with temperature for OFHC copper, and for a series of binary solid solutions of high-purity copper with zinc, gallium, germanium, arsenic and silicon, to investigate the effect of alloying elements in substitutional solid solution on grain boundary viscosity. (N1, Q22, Cu)

403-N. Internal Friction and Grain Boundary Viscosity of Silver and Binary Silver Solid Solutions. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, sec. 2, Aug. 1956, p. 894-901.

Measurements were made of the variation of internal friction with temperature for spectroscopically pure silver, and for a series of solid solutions of silver with cadmium, indium and tin, using a Ke-type torsion pendulum apparatus. (N1, Q22, Ag)

404-N. Self-Diffusion in Magnesium Single Crystals. P. G. Shewmon. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, sec. 2, Aug. 1956, p. 918-922.

Radioactive Mg^{28} was used to study the rate of self-diffusion in oriented single crystals of magnesium in the temperature range 468 to 635° C. (N1, Mg)

405-N. Recrystallization of Zone-Melted Aluminum. A. W. Demmler, Jr. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, sec. 2, Aug. 1956, p. 958-959. (N5, Al)

406-N. Microstructural Differences in Tempered Titanium Alloys. L. D. Jaffee. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, sec. 2, Aug. 1956, p. 961-962. (N6, J29, Ti)

407-N. Effect of the Annealing Temperature on the Formation of the Cube Texture. Alfonso Merlini. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, sec. 2, Aug. 1956, p. 967-972.

By a suitable choice of the penultimate grain size and rolling reduction, an OFHC copper strip was produced which has a low temperature (315° C.) annealing texture containing, in addition to the cube texture component, four components similar to those of the deformation texture. (N6, J23)

408-N. Solidification of Aluminum-Zinc Alloys. Donald Jaffe and Michael B. Bever. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, sec. 2, Aug. 1956, p. 972-975.

Solidification of aluminum-zinc alloys (2 to 70% Zn) was investigated at different rates of solidification. Resulting structures were studied, and amounts of nonequilibrium eu-

tectic were measured and compared with amounts calculated on the assumption of no diffusion in the solid. Compositions of the cored primary constituent were investigated by quantitative autoradiography after activation of the zinc by neutron irradiation. These compositions were also determined from microhardness values. (N12, Al, Zn)

409-N. Characteristics of the Bainite Transformation in a Ni-Cr Steel. L. S. Birks. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, sec. 2, Aug. 1956, p. 989-993.

Material and specimen preparation; X-ray techniques. (N8, AY)

410-N. Growth of Graphite in Cast Iron. C. E. Birchenall and H. W. Mead. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, sec. 2, Aug. 1956, p. 1004-1008.

The rates of growth of graphite nodules in cast iron are calculated for a model of a growing graphite sphere surrounded by a shell of austenite through which carbon and iron are diffusing. (N8, CI)

411-N. Primary Recrystallization Textures in Cold Rolled Si-Fe Crystals. C. G. Gunn and P. K. Koh. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, sec. 2, Aug. 1956, p. 1017-1024.

Recrystallization behavior of 11 crystals after cold rolling reductions of 70%. (N5, Q24, Fe-q)

412-N. Martensitic Transformation in Binary Titanium Alloys. Y. C. Liu. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, sec. 2, Aug. 1956, p. 1036-1040.

Investigation was made to determine whether other binary titanium alloys with β-stabilizing elements would exhibit a crystallography of transformation similar to that of Ti-Mn alloys. (N9, Ti)

413-N. On the Ordering Behavior of CuAu. C. J. Meechan and C. E. Dixon. *North American Aviation, Inc. (U. S. Atomic Energy Commission),* NAA-SR-1531, July 1956, 18 p.

The effects of disordering temperature, cold work and electron irradiation on the ordering rate of CuAu at 150 and 22° C. were measured. The ordering rate is increased by rapid quenching from above the critical temperature, cold working disordered samples, and irradiating disordered samples with 1 mev. electrons. (N10, Cu, Au)

414-N. The Diffusion of Helium in Thorium and Uranium. Alan Andrew, Clifton R. Davidson and Lyle E. Glasgow. *North American Aviation, Inc. (U. S. Atomic Energy Commisssion),* NAA-SR-1598, July 1956, 18 p.

Thorium and uranium foils were impregnated with alpha particles from the 60-in. Berkeley cyclotron. Subsequent heating showed that under 1040° C. no helium diffuses out of uranium. Helium was observed to diffuse out of thorium. (N1, Th, U)

415-N. (Czech.) Isothermal Decomposition of Austenite in Tungsten Alloyed Steels. II. The Influence of Tungsten on the Isothermal Decomposition of Austenite in 35Cr2V Steel. Josef Cadek. *Hutnické Listy,* v. 11, no. 7, July 1956, p. 409-419.

Thermomagnetic, metallographic, X-ray and microchemical analysis of the electrochemically isolated carbide phase in the decomposition products. (N8, AY)

416-N. (French.) Some Effects of Heat Treatment and Microstructure on the Transition Temperature of a 0.24% Carbon Steel. G. Burns and C. Judge. *Revue de Métallurgie,* v. 53, no. 7, July 1956, p. 510-521.

Austenite grain size at the beginning of cooling is shown to be a major factor affecting the transition temperature. Cooling rate also has a substantial effect. (N8, CN)

417-N. (German.) Annealing Processes in Martensite. Werner Jellinghaus. *Archiv für das Eisenhüttenwesen,* v. 27, no. 7, July 1956, p. 433-488.

Investigation of three unalloyed steels with 0.2, 0.4, and 0.8% of carbon by means of measuring magnetization, electrical resistance, coercivity power and change in volume. (N8, J23, CN)

418-N. (German.) Austenite Formation of Sub-Eutectoid Steels in Graphs of Time-Temperature-Solution. Adolf Rose and Werner Strassburg. *Stahl und Eisen.* v. 76, no. 15, July 26, 1956, p. 976-983.

Investigation of steels with 0.45%, 0.70%, 0.30% carbon, 1.1% chromium and 0.18% molybdenum. Effects of composition on pearlite and ferrite precipitation, effect of structural conditions. (N8, ST)

419-N. (Russian.) A Study of the Annealing Process in the Iron-Nitrogen System. V. G. Permiakov. *Metallovedenie i Obrabotka Metallov,* no. 7, July 1956, p. 2-9.

A study of the structure of com-

mercial iron tempered after various degrees of nitriding and changes occurring during heating. Tests made on iron with 0.02% carbon content. (N8, J23, J28, Fe)

420-N. (Russian.) Transformation of Residual Austenite—Basic Cause of Deformation in Welded Structures. A. V. Mordvintseva. *Metallovedenie i Obrabotka Metallov,* no. 7, July 1956, p. 48-54.

A study of causes of the deformation of welded structures at room temperature. Basic cause is the transformation of residual austenite. Most low-alloy steels undergo some deformation after welding. (N8, Q24, AY)

421-N. Correlation Effects in Diffusion in Crystals. A. D. Le Claire and A. B. Lidiard. *Philosophical Magazine,* v. 1, 8th ser., no. 6, June 1956, p. 518-527.

A simplified account of the random walk method of dealing with correlation effects in atomic diffusion in crystals. General formulae for the diffusion coefficient which take account of this correlation. (N1)

422-N. Solute Diffusion in Metals. L. C. R. Alfred and N. H. March. *Physical Review,* v. 103, ser. 2, Aug. 15, 1956, p. 877-878.

Use of more accurate fields around the solute atoms is shown to decrease very appreciably the descrepancy found by Blatt between theoretical and experimental values of activation energies for solute diffusion in silver. (N1, Ag)

423-N. Relationship Between Heat Treatment, Structure, and Mechanical Properties of a Titanium Alloy Containing 4% Cr and 2% Mo. A. W. Goldenstein and W. Rostoker. *American Society for Metals, Transactions,* v. 49, *Preprint No.* 13, 1956. 14 p.

Time - temperature - transformation characteristics, relationships between mechanical properties and heat treatment, influence of alpha platelet size on tensile properties, influence of original beta grain size on mechanical properties. (N6, Q general, J general, Ti)

424-N. On the Cooling Transformations in Some 0.40% Carbon Constructional Alloys Steels. D. J. Blickwede and R. C. Hess. *American Society for Metals, Transactions,* v. 49, *Preprint No.* 17, 1956, 21 p.

Cooling transformation diagrams were determined by metallographic observations of interrupted end-quench bars. (N8, AY)

425-N. Transformation Kinetics of Uranium-Niobium and Ternary Uranium-Molybdenum-Base Alloys. R. J. Van Thyne and D. J. McPherson. *American Society for Metals, Transactions,* v. 49, *Preprint No.* 19, 1956, 26 p.

Metallographic resistometric, X-ray diffraction and hardness techniques were employed to investigate transformation. (N6, U, Cb, Mo)

426-N. Transformation Kinetics of Uranium-Molybdenum Alloys. R. J. Van Thyne and D. J. McPherson. *American Society for Metals, Transactions,* v. 49, *Preprint No.* 20, 1956, 30 p.

Metallographic, room temperature electrical resistometric, X-ray diffraction spectrometer and hardness techniques were employed to study the stability of the gamma phase which can be retained to room temperature by water quenching. (N6, U, Mo)

427-N. Precipitation Reactions in Austenite Cr-Mn-C-N Stainless Steels. Chi-Mei Hsiao and E. J. Dulis. *American Society for Metals, Transactions,* v. 49, *Preprint No.* 26, 1956, 30 p.

Both the grain boundary reaction and the general precipitation reaction increase hardness of the steel. The former occurs by a nucleation and growth process. (N7, SS)

428-N. Martensitic Transformation in the Machining of Austenitic Stainless Steel. E. F. Erbin, E. R. Marshall and W. A. Backofen. *American Society for Metals, Transactions,* v. 49, *Preprint No.* 27, 1956, 21 p.

Planing and grinding of Types 301 and 304 austenitic stainless steel cause transformation of austenite to martensite. Extent of the transformation was determined quantitatively with an X-ray diffraction technique and related to the stresses, strains, and cutting energies. (N8, G17, SS)

429-N. Transformation Products in Cold-Worked Austenitic Manganese Steel. R. K. Buhr, S. L. Gertsman and James Reekie. *American Society for Metals, Transactions,* v. 49, *Preprint No.* 28, 1956, 13 p.

Small amounts of a ferromagnetic transformation product are formed when the steel is work hardened by impact. This constituent is concentrated along the traces of slip planes and at grain boundaries and is probably tempered martensite. (N8, N7, AY)

430-N. Phase Relationships and Mechanical Properties of Some Iron-

Chromium-Carbon-Nitrogen Alloys. G. F. Tisinai and C. H. Samans. *American Society for Metals, Transactions,* v. 49, *Preprint No.* 30, 1956, 15 p.

Tensile tests at room and elevated temperatures showed that the austenitized alloys had much higher strengths than the austenitic iron-chromium-nickel steels but still had excellent ductilities.
(N8, Q general, Fe, Cr)

431-N. Aging Reactions in Certain Super Alloys. W. C. Hagel and H. J. Beattie, Jr. *American Society for Metals, Transactions,* v. 49, *Preprint No.* 40, 1956, 26 p.

Changes in the properties and structures of N-155, G-18B and 15-15N alloys were determined as a function of solutioning at 1800 to 2200° F. and aging at 1200 to 1600° F. for times up to 1000 hr.
(N7, SG-h)

432-N. The Tempering of Iron-Carbon Martensite Crystals. F. E. Werner. B. L. Averbach and Morris Cohen. *American Society for Metals, Transactions,* v. 49, *Preprint No.* 43, 1956, 20 p.

A single-crystal X-ray study of the matrix of quenched and tempered iron-carbon and iron-carbon-nickel alloys. (N8, J29, CN)

433-N. (German.) **Kinetics of Austenite Formation of Alloyed and Low-Alloyed Sub-Eutectoid Steels.** Adolf Rose and Werner Strassburg. *Archiv für das Eisenhüttenwesen,* v. 27, no. 8, Aug. 1956, p. 513-520.

Study of austenite formation through nucleation and growth in steels with 0.45% carbon, 0.70% carbon, and 0.30% carbon, 1.1% chromium, and 0.18% molybdenum according to photo and electronic-optical structural pictures. (N8, AY)

434-N. (German.) **New Investigations and Conceptions in the Field of Recrystallization Research.** W. G. Burgers. *Berg- und Hüttenmännische Monatshefte der Montanistischen Hochschule in Leoben,* v. 101, no. 7, July 1956, p. 151-154.

Difference between recovery and recrystallization. Nucleus formation during recrystallization. "Polygonization" phenomenon. (N5)

435-N. (Polish.) **The Effect of Stable Carbide-Forming Elements on the Isothermal Transformation of Supercooled Austenite.** H. Matyja. *Hutnik,* v. 23, no. 7-8, July-Aug. 1956, p. 285-290.

Applying the crystallization theory to the process of isothermal transformation of austenite. How the alloying elements effect the process. Details of test of isothermal transformation made on two Cr-Ni-Ti steels. (N8, AY)

436-N. Solubility of Hydrogen in Iron-Carbon-Silicon Alloys. V. B. John and T. Evans. *Foundry Trade Journal,* v. 101, Aug. 23, 1956, p. 189-196.

Silicon causes a decrease and graphite an increase in hydrogen solubility. (N12, Si, Fe)

437-N. Single Crystal Bismuth Telluride. L. Ainsworth. *Physical Society, Proceedings,* v. 69, no. 438B, June 1956, p. 606-612.

Crystal growth by the Stockbarger method and by directional freezing in a horizontal boat was not satisfactory because of segregation of tellurium towards the last end of the ingot to freeze. Large crystals were produced by the pulling method, using a hydrogen atmosphere.
(N12, P15, Bi, Te)

438-N. Carbon Migration in Welded Joints at Elevated Temperatures. R. J. Christoffel and R. M. Curran. *Welding Journal,* v. 35, Sept. 1956, p. 457s-468s.

While tests did not show that carbon migration had a profound effect on physical properties, composite weldments at temperatures at which carbon migration may occur should be carefully evaluated. (N1, K1)

439-N. Widmanstätten and Other Abnormal Graphite Forms in Cast Iron. E. Bull Simonsen and Floyd Brown. *Institute of British Foundrymen,* v. 48, p. 244A-250A; disc., p. 250A-254A.

No correlation between metal composition and the occurrence of abnormal graphite was observed. Formation of Widmanstätten-type graphite is neither a function of a critical cooling-rate nor reproducible after heat treatment; it was associated with a lead addition to a melt, tin giving a negative result. (N8, CI)

440-N. Determination of Retained Austenite in High Speed Steel by Magnetic Method. A. I. Gardin. *Henry Brutcher Translation No.* 3793, 11 p. (From *Zavodskaya Laboratoriya,* v. 22, no. 3, 1956, p. 303-309.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 230-N, 1956.
(N8, M23, J26, J29, TS)

441-N. (English.) **The Kinetics of Grain Boundary Nucleated Reactions.** John W. Cahn. *Acta Metallurgica,* v. 4, no. 5, Sept. 1956, p. 449-459.

Rate laws are derived for transformations in which the new phase nucleates on grain boundary surface, grain edges, or grain corners, and in which the new phase grows with constant radial velocity. (N2)

442-N. (English.) **A Dislocation-Attraction Model for the First Stage of Tempering.** B. S. Lement and Morris Cohen. *Acta Metallurgica,* v. 4, no. 5, Sept. 1956, p. 469-476.

Model predicts that the time exponent of the isothermal reaction should be 1/3, and the activation energy for the reaction should equal that for diffusion of carbon in martensite. The activation energy for diffusion of carbon is about 50% higher in martensite than in α-ferrite. (N8, N1, P12, ST)

443-N. (English.) **X-Ray and Calorimetric Investigations of Cold Working and Annealing of a Gold-Silver Alloy.** B. L. Averbach, M. B. Bever, M. F. Comerford and J. S. Li. Leach. *Acta Metallurgica,* v. 4, no. 5, Sept. 1956, p. 477-484.

The energy stored in filings of a 75 Au, 25 Ag alloy is released during the recovery and recrystallization processes. Most of the stored energy is associated with the presence of low energy boundaries introduced during deformation; average specific interfacial energy for these boundaries was calculated.
(N4, N5, P10, Au, Ag)

444-N. (English.) **Kinetics of Precipitation in Small Lead-Tin Spheres.** W. DeSorbo and D. Turnbull. *Acta Metallurgica,* v. 4, no. 5, Sept. 1956, p. 495-509.

New calorimetric technique was used for study. Precipitation energies in powder samples, consisting largely of single-crystal particles, were found to be 1/10 to 1/400 of the values reported for bulk-polycrystalline alloys of the same composition. (N7, Pb, Sn)

445-N. (English.) **Calorimetric Measurements of the Grain-Boundary Energy in Zinc.** *Acta Metallurgica,* v. 4, no. 5, Sept. 1956, p. 562-563.

An electrically heated and regulated thermostat with a very large heat capacity was used for direct measurement of grain-boundary energy. (N3, P12, Zn)

446-N. (French.) **Making Lithium Monocrystals.** Georges Champier. *Comptes Rendus,* v. 243, no. 7, Aug. 13, 1956, p. 657-659.

Description and discussion of method. (N12, Li)

447-N. (French.) **Transforming Cubic Nickel Into Hexagonal Nickel.** Jean-Jacques Trillat, Léa Tertian and Nobuzo Terao. *Comptes Rendus,* v. 243, no. 7, Aug. 13, 1956, p. 666-668.

Transformation by bombardment with ions of an energy of the order of 12 kv. The cubic form is restored by heating under vacuum. Kinetics of transformations and oxidation under reduced pressure. (N6, R2, Ni)

448-N. (German.) **Fifty Years of Precipitation Hardening.** G. Gürtler. *Aluminium,* v. 32, no. 9, Sept. 1956, p. 575-580.

General review on the occasion of the anniversary of the discovery of Duralumin by Wilm.
(N7, A2, J27, Al)

449-N. (German.) **The Effect of Distance Between Dendritic Bands and of Austenitic Grain Size on the Formation of Ferrite-and-Pearlite Band Structure.** Urs Wyss. *Schweizer Archiv für Angewandte Wissenschaft und Technik,* v. 22, no. 8, Aug. 1956, p. 258-260.

In hypo-eutectoid steels, the transformation of austenite in the pearlite range starts by ferrite precipitation along the austenite grain boundaries within such bands, which are more inclined to transformation. The smaller the austenitic grain size, the more probable is a band-like arrangement of ferrite. (N8, ST)

450-N. (German.) **Transitions of Beta Into Omega and Alpha Phases in Titanium Alloys.** Horst Böhm and Herbert Westphal. *Zeitschrift für Metallkunde,* v. 47, no. 8, Aug. 1956, p. 558-563.

Owing to the precipitation of the omega-phase, certain cooling or age hardening conditions will cause some alloys to harden or become brittle. (N6, N7, Ti)

451-N. (German.) **Effect of Alloying Elements on Recrystallization of Titanium.** Rudolf Reinbach and Alexei Nowikow. *Zeitschrift für Metallkunde,* v. 47, no. 8, Aug. 1956, p. 583-584.

At 480° C. softening and recrystallization of titanium which had been reduced with magnesium was markedly delayed by chromium contents between 0.2 and 0.5%, while contents of aluminum, cobalt, iron, tin and tantalum in the same range were only of minor influence.
(N5, Ti)

452-N. (Italian.) **Aging of Steel 16-25-6 and Identification of Precipitates.** A. Ferro, S. Gallo and C. P. Galotto. *Metallurgia Italiana,* v. 48, no. 8, Aug. 1956, p. 361-368.

The precipitation of nitrides and

carbides in a stainless steel containing nitrogen is followed by X-ray diffraction and the electron microscope. (N7, SS)

453-N. (Russian.) **Diffusion Constants and X-Ray Absorption of Atoms in Alloys.** I. Ia. Dekhtiar. *Doklady Akademii Nauk SSSR,* v. 108, no. 6, June 1956, p. 1069-1071.

Interatomic reaction in alloys based on iron, cobalt, nickel and other elements. Relation between diffusion constants and absorption K-spectra of cobalt.
(N1, M22, M26, Fe, Co, Ni)

454-N. (Russian.) **Size Alteration of Carbide Crystals in Annealing Quenced Chrominum Steel.** Z. K. Kos'ko. *Doklady Akademii Nauk SSSR,* v. 108, no. 6, June 1956, p. 1072-1075.

Formation of carbide with minimum size of crystals in a steel containing 0.7% carbon and 3.8 or 18% of chromium. (N8, J23, AY)

455-N. (Russian.) **Thermodynamic Method of Studying Ferromagnetic Transformations in Alloys.** K. P. Belov and A. N. Goriaga. *Fizika Metallov i Metallovedenie,* v. 2, no. 3, 1956, p. 441-446.

Determination of ideal magnetization curves of copper-nickel alloys in the vicinity of the Curie point. Thermodynamic analysis shows the temperature dependence of the spontaneous magnetization in these alloys, which varies considerably with structural changes.
(N11, P16, Cu, Ni)

456-N. (Russian.) **The Effect of Adding Silver to Zinc to Aluminum on the Velocity of Diffusion of Copper Therein.** V. I. Arkharov and N. I. Noskova. *Fizika Metallov i Metallovedenie,* v. 2, no. 3, 1956, p. 472-476.

An attempt to explain the rapid aging of aluminum-copper alloys with small additions of silver and zinc by the known accelerating effect of higher concentrations of these additives on the velocity of the diffusion of copper in such alloys. (N1, N7, Al, Cu)

457-N. (Russian.) **The Effect of Intragranular Separation Boundaries on the Coefficient of Self-Diffusion of Iron in Iron-Nickel-Carbon Alloys.** B. M. Noskov, E. V. Kuznetsov and G. V. Shcherbedinskii. *Fizika Metallov i Metallovedenie,* v. 2, no. 3, 1956, p. 489-493.

A study on specimens of various structure. In specimens in which the diffusion annealing was preceded by a martensite transformation, the coefficient of self-diffusion is found to be 2 to 3 times higher than in specimens with no martensite transformation. (N1, N8, Fe, Ni)

458-N. (Russian.) **The Effect of Intrusion Atoms on the Ordering of Alloys.** A. A. Smirnov and I. A. Stoianov. *Fizika Metallov i Metallovedenie,* v. 2, no. 3, 1956, p. 524-530.

The effect of intrusion atoms on alloys of body-centered cubic structure. Presence of intrusion atoms is shown to increase the ordering of the alloy and to raise the temperature of ordering. (N10)

459-N. (Russian.) **The Formation of the Sigma Phase in High-Alloy Austenitic Alloys.** E. M. Pivink. *Fizika Metallov i Metallovedenie,* v. 2, no. 3, 1956, p. 531-537.

Application of methods of color metallography and radiography in the study of formation of the sigma-phase in austenitic solid solutions proves the existence of two intermediate phases formed prior to the emergence of the sigma phase in the solution. Formation of sigma phase lowers the plastic properties of the alloy. (N8, AY)

460-N. (Russian.) **Interfacial and Intragranular Diffusion of Manganese in Iron.** D. S. Kazarnovskii. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* no. 7, July 1956, p. 94-102 + 2 plates.

Experiments to determine the relation between the course of diffusion of manganese into iron and the method of smelting the latter.
(N1, Mn, Fe)

461-N. (Russian.) **Investigation of Diffusion in a Binary Alloy as a New Method of Physical-Chemical Analysis.** M. B. Neiman and A. Ia. Shimiaev. *Zhurnal Neorganicheskoi Khimii,* v. 1, no. 6, 1956, p. 1257-1263.

Study of a nickel-iron-molybdenum alloy shows that the chemical compounds in it make significant changes in the curves of diffusion characteristics versus alloy composition. (N1, S11, Ni, Fe, Mo)

462-N. (Russian.) **Thermoelectric Method of Study of Transformations in Metals and Alloys.** A. A. Rudnitskii. *Zhurnal Neorganicheskoi Khimii,* v. 1, no. 6, 1956, p. 1305-1321.

First order transformations in metals and alloys are of two types: one caused an abrupt rise in the absolute thermal e.m.f.; the other is accompanied by an abrupt decrease of the absolute thermal e.m.f.
(N general, P15)

463N. (Russian.) **Solid Solutions Based on Metallic Compounds.** E. I. Gladyshevskii, and E. E. Cherkashin. *Zhurnal Neorganicheskoi Khimii,* v. 1, no. 6, 1956, p. 1394-1401.

Solubility of zinc, aluminum, tin and antimony in $MgCu_2$ at 400° C.; solubility of metals in electronic compounds; reciprocal solubility of silicides at 400° C.
(N12, Mg, Cu, Zn, Al, Sn, Sb, Si)

464-N. (Russian.) **Effect of Various Elements on Carbon Solubility in Iron.** N. A. Vatolin and O. A. Esin. *Zhurnal Obshchei Khimii,* v. 26, no. 6, June 1956, p. 1543-1548.

Effect of phosphorus, chromium, manganese, sulphur and vanadium on carbon solubility in liquid iron, and silicon on carbon solubility in liquid manganese and ferrochromium. Explanation on basis of theory of regular solutions.
(N12, Fe, Cr, Mn, V, Si)

465-N. (Russian.) **Diffusion of Hydrogen Through Iron and Binary Iron-Chromium and Iron-Nickel Alloys at High Pressures and Temperatures.** A. A. Shcherbakova. *Zhurnal Prikladnoi Khimii,* v. 29, no. 6, June 1956, p. 879-884.

Relation of rate of hydrogen diffusion to the chromium content in iron-chromium alloys at various temperatures, and to the nickel content in iron-nickel alloys. (N1, Fe, Cr, Ni)

466-N. (Spanish.) **Transformation of Austenite During the Continuous Cooling Process in New Hypoeutectoid Chromium-Nickel Steels.** Benjamin Estruch Subirana. *Instituto del Hierro y del Acero,* v. 9, no. 48, July 1956, p. 871-882.

Results are compared with those obtained by the isothermal transformation and with those calculated from the theory of additivity.
(N8, AY)

467-N. Decomposition of the Beta Phase in a Copper-Gallium Eutectoid Alloy. Chester W. Spencer and David J. Mack. *Institute of Metals, Journal,* v. 84, Aug. 1956, p. 461-466.

Experimental procedure including isothermal transformation at various temperatures. Observed changes in quenched-tempered specimens, and during furnace-cooling.
(N9, N6, Ga, Cu)

468-N. Electron-Microscopic Observations on the Precipitation of the Theta Phase in an Aluminum-4% Copper Alloy. E. Langer. *Institute of Metals, Journal,* v. 84, Aug. 1956, p. 471-472.

Indicates that precipitation occurs in slip planes and polygon boundaries, but not in grain boundaries. (N7, Al, Cu)

469-N. Effect of Electron Irradiation and Quenching on the White-to-Gray Tin Transformation. A. Sosin. *North American Aviation, Inc. (U. S. Atomic Energy Commission),* NAA-SR-1550, Aug. 1956, 8 p.

Electron irradiation at approximately 78° K. and quenching from 200° C. have no effect on the transformation. Dislocation loops may be responsible for neutron-induced acceleration. (N6, Sn)

470-N. Self-Diffusion in Silver-Zinc. D. Lazarus and C. T. Tomizuka. *Physical Review,* v. 103, ser. 2, Sept. 1, 1956, p. 1155-1158.

Diffusivities of radio silver-110 and radio zinc-65 in an alloy of 70 at. % silver and 30 at. % zinc were measured over the temperature range 500 to 700° C. using sectioning techniques. (N1, Ag, Zn)

471-N. Self-Diffusion in Silver. C. T. Tomizuka and E. Sonder. *Physical Review,* v. 103, ser. 2, Sept. 1, 1956, p. 1182-1184.

Coefficients were determined from 630 to 935° C. (N1, Ag)

472-N. Self-Diffusion of Gold. B. Okkerse. *Physical Review,* v. 103, ser. 2, Sept. 1, 1956, p. 1246-1249.

Measured in single crystals from 600 to 954° C. with radio gold-198 as tracer and applying the sectioning technique. (N1, Au)

473-N. (English.) **On the Crystallization of Graphite in Cast Irons. I.** Karsay. *Acta Technica Academiae Scientiarum Hungaricae,* v. 15, no. 1-2, 1956, p. 99-125.

A fourth form of graphite is described in this theoretical paper.
(N8, CI)

474-N. (English.) **Elastic After-Effect.** Takasi Huzimura and Tomiya Sutoki. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 8, no. 2, Apr. 1956, p. 79-86.

Phenomenon was studied with metal wires at various temperatures, and the results were explained by the theory of recovery based on the dislocation model. (N4, M26)

475-N. (English.) **On the Solution-Body Phenomenon and Anisotropy of Solution Rate in a Tetragonal Tin Crystal.** Mikio Yamamoto and Jiro Watanabe. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 8, no. 4, Aug. 1956, p. 271-279.

A clear-cut solution body was pro-

duced only with an originally spherical crystal etched with concentrated hydrochloric acid. Crystallographic data are presented. (N12, M26, Sn)

476-N. (French.) **Experimental Study of Some Factors Determining the Solidification Speed of Sand Cast Bronze Cylinders.** M. Pell-Walpole. *Fonderie,* no. 127, Aug. 1956, p. 297-305.

Relationship between solidification speed and dimensions and form of casting, casting temperature, mold temperature, alloy composition, sand casting components, cylinder wall thickness. (N12, E11, Cu)

477-N. (French.) **Study of Hardening Phenomena in an Aluminum-Copper Alloy With 4% Copper Content.** René Graf. *Publications Scientifiques et Techniques du Ministere de l'air,* no. 315, 1956, 100 p.

Quantitative and X-ray study of kinetic precipitation at various temperatures. Results show that the various constituents are formed according to independent processes. (N7, J26, Al, Cu)

478-N. (German.) **Tertiary Basic Transition of Zn-Crystals.** Friedrich Blaha. *Acta Physica Austriaca,* v. 10, no. 3, 1956, p. 239-241.

Primary and secondary basic transition. Interpretation of crystal growth and formation of twin crystals. (N6, N3, Zn)

479-N. (Polish.) **The Solubility of Oxygen in Liquid Nickel and in Liquid Solutions of Iron and Nickel.** W. P. Fiedotow and A. M. Samarin. *Archiwum Hutnictwa,* v. 1, no. 3, 1956, p. 183-193.

Work is based on experimental data for the above systems with water vapor and hydrogen. (N16, Fe, Ni)

480-N. (Russian.) **The Effect of Stresses on the Formation of Graphitization Centers During Annealing of White Cast Iron.** V. F. Zubarev. *Liteinoe Proizvodstvo,* no. 8, Aug. 1956, p. 21-25.

Thermal and structural stresses are important in the formation of graphitizing centers, but only at low temperatures. The effects of thermal and chemical operations are considered. (N8, Q25, J23, CI)

481-N. (Russian.) **The Serial Production of Monocrystals From Melts.** B. N. Bushmanov. *Zhurnal Fizicheskoi Khimii,* v. 30, no. 7, July 1956, p. 1668-1669.

Production of zinc monocrystals by Bridgman's method in a furnace of 100-mm. diameter with 19 crystallization tubes let down simultaneously from a single carrier. Output exceeds by several times that attained when the crystals are grown one by one. (N12, Zn)

482-N. (Russian.) **Problem of Factors Affecting Transformation of White Tin Into Gray Tin.** A. I. Bykhovskii. *Zhurnal Tekhnicheskoi Fiziki,* v. 26, no. 8, Aug. 1956, p. 1799-1801.

Discussion of factors affecting transformation of beta tin to alpha tin, including the effect of impurities (lead, bismuth, antimony) on the surface energy of the tin. (N6, Sn)

483-N. What Do We Know About Hydrogen in Steels? I. C. R. Simcoe. *Iron Age,* v. 178, Oct. 4, 1956, p. 98-101.

Comprehensive survey of significant research deals with permeability, solubility, diffusion and flaking as they apply to hydrogen content in steel. (N1, N12, ST)

484-N. Some Effects of Hot Strip Mill Rolling Temperatures on Properties of Low Carbon Sheet Coils. D. T. Goettge and E. L. Robinson. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Sept. 1956, p. 1169-1174.

Phase changes occurring during rolling are metallurgically significant when related to commonly used temperature control points, particularly finishing and coiling temperatures. These temperatures influence level and uniformity of hardness, grain size and carbide characteristics of the finished hot and cold rolled sheets. (N8, F23, Q29, CN)

485-N. Oxygen in Liquid Iron-Nickel Alloys. Henry A. Wriedt and John Chipman. *Journal of Metals,* v. 8, *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Sept. 1956, p. 1195-1199.

Equilibrium in the reaction of hydrogen gas with oxygen in liquid nickel, iron and their alloys studied at temperatures of 1500 to 1700° C. (N14, N16, Fe, Ni)

486-N. (English.) **An X-Ray Study of Ordering Processes in CuAu Single Crystals.** Makoto Hirabayashi and Shiro Ogawa. *Physical Society of Japan, Journal,* v. 11, no. 9, Sept. 1956, p. 907-914.

Characteristic diffuse scattering effects were observed at early stages. The change in X-ray diffraction pattern during aging is discussed on the basis of kinetics of the ordering reaction. (N10, Cu, Au)

487-N. (German.) **Dependence of the Diffusion Coefficient on Concentration in the System Copper-Nickel.** V. Freise and F. Sauer. *Zeitschrift für Physikalische Chemie (Frankfurt),* v. 8, no. 5-6, Sept. 1956, p. 387-389.

Attempts to verify certain previous findings concerning the relationship between diffusion coefficient and relative concentration of the components. (N1, Cu, Ni)

488-N. (Russian.) **Effect of the Internal Structure of Austenite Grains on the Solid-Solution Strength at High Temperature.** G. V. Kurdiumov, E. Z. Kaminskii and V. M. Rozenberg. *Doklady Akademii Nauk SSSR,* v. 109, no. 1, July-Aug. 1956, p. 85-87 + 1 plate.

Relation between strength, temperature of heat treatment and stress magnitude on a solid solution of iron with 29% by weight of nickel and 1% titanium. (N8, Q23, N12, AY)

489-N. (Book.) **Atlas of Isothermal Transformation Diagrams of B. S. En Steels.** 2nd Ed., 157 p. 1956. The Iron and Steel Institute, 4 Grosvenor Gardens, London, S.W.1, England.

Each direct-hardening type of steel is represented by a single diagram, but four or more diagrams are considered necessary to represent adequately the transformation characteristics of each carburizing steel. (N8, ST)

490-N. Solubility Determination, Diffusion and Mechanical Effects of Hydrogen in Uranium. W. D. Davis. *Knolls Atomic Power Laboratory (U. S. Atomic Energy Commission),* KAPL-1548, Aug. 1956, 67 p.

Analytical method for determining solubility in the alpha phase for biscuit uranium. (N1, N12, U)

491-N. The de Haas-van Alphen Effect in Alloys. V. Heine. *Physical Society, Proceedings,* v. 69, no. 439A, July 1956, p. 505-512.

Theory of primary solid solutions applied to dilute alloys. Experimental results were in agreement with theory, except where there is a bound state around the solute atoms. (N12)

492-N. (English.) **The Advance of Mono-Molecular Steps on the Surface of a Growing Kossel Crystal as a Random Walk Problem.** R. Gevers. *Physica,* v. 22, no. 9, Sept. 1956, p. 832-842.

If supersaturation and jump probabilities, which depend strongly on temperature, are given, an expression for lateral growth velocity of step can be calculated. (N12)

493-N. (French.) **A Few Considerations on the Determination of the Points of Transformation of Steels Through the Differential Dilatometric Method.** J. Papier. *Centre de Documentation Siderurgique, Circulaire d'Informations Techniques,* v. 13, no. 9, 1956, p. 1831-1835.

Comparison of dilatometric diagrams applied to self-hardening, manganese-silicon, and chromium steels. Analysis of the method as regards its accuracy and advantages. (N8, AY)

494-N. (German.) **Pearlite and Martensite Formation in Hard Manganese Steel.** Klaus J. Janssen and Werner Jellinghaus. *Archiv für das Eisenhüttenwesen,* v. 27, no. 9, Sept. 1956, p. 573-578.

Investigation of structure and saturation measurement on 400 to 750° C. isothermally transformed samples of manganese steel with 1.29% carbon and 13% manganese. Temperature-magnetization curves for determination of martensite point and the carbide-Curie point. (N8, AY)

495-N. (German.) **Electron-Emissions During Smelting and Crystallization of Metals.** Jürgen Lohff. *Zeitschrift für Metallkunde,* v. 47, no. 9, Sept. 1956, p. 644-646.

The electron emission of Woods metal, bismuth, tin and lead during fusion and solidification in vacuum was investigated. (N12, Bi, Pb, Sn)

496-N. (Italian.) **The Zone-Melting Process in the Study of Systems With More Than Two Components.** F. Mazzoleni. *Metallurgia Italiana,* v. 48, no. 9, Sept. 1956, p. 401-405.

Possibilities of application of zone-melting process to the experimental study of metal alloys with two or more components, particularly to direct determination of possible eutectic composition. (N12, C5)

497-N. (Russian.) **Diagram of Chromium Recrystallization.** E. M. Savitskii, V. F. Terekhova and A. V. Kholopov. *Doklady Akademii Nauk SSSR,* v. 109, no. 4, Aug. 1, 1956, p. 794-795 + 1 plate.

Construction of recrystallization diagram of electrolytic chromium permits determination of change in crystalline structure in respect to annealing temperature and degree of cold deformation. (N5, Cr)

498-N. (Russian.) **X-Ray and Electron-Microscopic Investigation of the Aging of Al-Zn Alloy.** N. N. Buinov and L. I. Podrezov. *Izvestiia Aka-*

demii Nauk SSSR, Seriia Fizicheskaia, v. 20, no. 6, June 1956, p. 611-613 + 1 plate.

Role of zinc in concentrating along zones determines aging process. Role of stresses caused by "hydrostatic" pressure. Restructuring of crystal lattice. (N7, Al, Zn)

499-N. (Russian.) **Change in Fine Crystal Structure of Austenitic Manganese Steel During Plastic Deformation.** O. V. Bogorodskii and Ia. S. Umanskii. *Izvestiia Akademii Nauk SSSR, Seriia Fizicheskaia,* v. 20, no. 6, June 1956, p. 614-620.

Two methods of calculating mosaic-block structure and micro-deformations. Strain-hardening factor during cold deformation can be calculated. (N8, Q24, AY)

500-N. (Russian.) **Investigation of the Eutectoid Transformation of an Alloy of Copper and Tin.** M. I. Zakharova and I. B. Mogarycheva. *Izvestiia Akademii Nauk SSSR, Seriia Fizicheskaia,* v. 20, no. 6, June 1956, p. 621-623 + 1 plate.

Eutectoid transformation of the beta phase in alloys of copper with 27% tin at temperatures of 150 to 350° C. takes place successively in different zones of the single crystal. (N9, Cu, Sn)

501-N. (Russian.) **Structural Changes in Pure Metals During Stress Relaxation.** B. M. Rovinskii and V. G. Liutsai. *Izvestiia Akademii Nauk SSSR, Seriia Fizicheskaia,* 20, no. 6, June 1956, p. 636-638 + 1 plate.

During relaxation in aluminum and copper irreversible structural changes develop in the crystallites similar to those during small plastic deformation. (N6, Q24, Al, Cu)

502-N. (Russian.) **Change in Substructure of Aluminum in Small Plastic Deformation and in Creep.** B. M. Rovinskii and L. M. Rybakova. *Izvestiia Akademii Nauk SSSR, Seriia Fizicheskaia,* v. 20, no. 6, June 1956, p. 646-649 + 1 plate.

Interference-spot X-ray pictures show that structural changes within crystallites during creep are qualitatively similar to those during simple tension. Application of a load directly increases the completeness of crystallites. (N6, Q3, Q27, Al)

503-N. (Russian.) **X-Ray Study of the Recrystallization of Some High-Melting Compounds.** S. S. Gorelik and Ia. S. Umanskii. *Izvestiia Akademii Nauk SSSR, Seriia Fizicheskaia,* v. 20, no. 6, June 1956, p. 650-652.

Relation of start of recrystallization to annealing temperatures for tungsten carbide and nickel-aluminum. Relaxation begins before recrystallization. (N5, Ni, Al, W)

504-N. (Russian.) **Peculiarities of the Recrystallization of Some Two-Phase Aging Alloys.** S. S. Gorelik. *Izvestiia Akademii Nauk SSSR, Seriia Fizicheskaia,* v. 20, no. 6, June 1956, p. 653-658 + 1 plate.

Relation between degree of deformation and recrystallization starting temperature. Effect of aging prior to deformation.
(N5, N7, Ni, Cu, Cr, Be, Al, Ti)

505-N. (Russian.) **X-Ray Study of Secondary Structure of Crystallites of Recrystallized Metals.** V. N. Shcherbakov. *Izvestiia Akademii Nauk SSSR, Seriia Fizicheskaia,* v. 20, no. 6, June 1956, p 714-720.

Mosaic disorder of primary polycrystalline structure of crystallites. Effect of type and per cent of impurities and course of heat treatment on mosaic disorder.
(N5, Al, Cu)

506-N. The Tempering of Plain Carbon Steels. E. D. Hyam and J. Nutting. *Iron and Steel Institute, Journal,* v. 184, Oct. 1956, p. 148-165.

Progress of tempering was followed by taking hardness measurements, from which it was possible to calculate activation energy of softening process. Softening is controlled by a mechanism involving self-diffustant thickness. (N15, M26, Zn)

507-N. Growth Mechanisms of Near-Perfect Crystals. G. W. Sears and R. V. Coleman. *Journal of Chemical Physics,* v. 25, Oct. 1956, p. 635-637.

Direct evidence that whisker growth by vapor deposition occurs at the tip rather than the base. Platelets are shown to grow at constant thickness. (N15, M26, Zn)

508-N. Growth of Mercury Platelets From the Vapor. Gerald W. Sears. *Journal of Chemical Physics,* v. 25, Oct. 1956, p. 637-642.

Mechanism for the vapor deposition. Growth behavior is accounted for on the basis of a single screw dislocation in a [110] crystallographic direction. (N15, M26, Hg)

509-N. Distribution Coefficient of Boron in Germanium. Henry E. Bridgers and E. D. Kolb. *Journal of Chemical Physics,* v. 25, Oct. 1956, p. 648-650.

Measurements made as a function of crystal growth rate. Behavior agrees with that predicted by the

theory of Burton for a solute whose equilibrium distribution coefficient is greater than unity. (N12, Ge)

510-N. Solubility of Lithium in Doped and Undoped Silicon, Evidence for Compound Formation. H. Reiss, C. S. Fuller and A. J. Pietruszkiewicz. *Journal of Chemical Physics,* v. 25, Oct. 1956, p. 650-655.

At both low and high temperatures the solubility in the doped crystal markedly exceeds that in the undoped one. It just about equals the boron concentration in these ranges. (N12, Li)

511-N. Theory of the Ionization of Hydrogen and Lithium in Silicon and Germanium. Howard Reiss. *Journal of Chemical Physics,* v. 25, Oct. 1956, p. 681-686.

Effective mass-quantum mechanical investigation of the ionizability of interstitial hydrogen and lithium. Concludes that hydrogen should not ionize while lithium should. (N12, M25, Li, Si, Ge)

512-N. Sympathetic Nucleation of Ferrite. H. I. Aaronson and C. Wells. *Journal of Metals,* v. 8, sec. 2, *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Oct. 1956, p. 1216-1223.

Configurations of ferrite crystals found in a plain carbon steel appear to have resulted from the nucleation of new ferrite crystals at the interphase boundaries of previously formed crystals, despite the high carbon concentrations. (N2, CN)

513-N. Temperature Dependence of Recovery Phenomena in a Cold Rolled Aluminum Single Crystal. A. H. Lutts and Paul A. Beck. *Journal of Metals,* v. 8, sec. 2, *American Institute of Mining and Metallurgical Engineers, Transactions, v. 206, Oct. 1956, p.* 1226-1228.

Study of line sharpening and of the initial softening with high-purity aluminum. Isothermal line sharpening data and softening curves obtained for several temperatures. (N4, Al)

514-N. Recovery of Cold Worked High Purity Al-Mg Alloys. E. C. W. Perryman. *Journal of Metals,* v. 8, sec. 2, *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Oct. 1956, p. 1247-1252.

Recovery of X-ray line broadening, hardness and electrical resistivity was investigated. Results suggest that magnesium atoms freeze in the excess vacancies and that this affects the climb of dislocations during the recovery process. (N4, Al, Mg)

515-N. Neutron Diffraction Study of Annealing Textures in Drawn Body-Centered Cubic Metals. R. A. Swalin and A. H. Geisler. *Journal of Metals,* v. 8, sec. 2, *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Oct. 1956, p. 1259-1263.

Cold drawn molybdenum, iron and an iron-base alloy containing 14% aluminum investigated as a function of annealing temperature by using diffraction techniques. Upon recrystallization, the [110] deformation texture was retained in all cases. (N5, Q24, Al, Fe, Mo)

516-N. Study of the Fe-Si Order-Disorder Transformation. Frank W. Glaser and W. Ivanick. *Journal of Metals,* v. 8, sec. 2, *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Oct. 1956, p. 1290-1295.

Silicon content in disordered samples ranged from 8 to 28 at. %. Critical temperature for disorder was highest for the stoichiometric composition of Fe_2Si. (N10, P, Si, Fe)

517-N. Recrystallization and Grain Growth in Iodide Zirconium. R. M. Treco. *Journal of Metals,* v. 8, sec. 2, *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Oct. 1956, p. 1304-1311.

Investigation of swaged crystal bar zirconium. Plastic deformation and growth processes affecting the microstructure were studied. (N5, N3, Q24, Zr)

518-N. Self-Diffusion of Iron in Austenite. H. W. Mead and C. E. Birchenall. *Journal of Metals,* v. 8, sec. 2, *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Oct. 1956, p. 1336-1339.

Studied for 0 to 1.4 wt. % C. from 1000 to 1300° C. A large increase in diffusivity and decrease in activation energy with increasing carbon content were observed. (N1, Fe)

519-N. Interaction of Dislocations and Long-Range Order. N. Brown and M. Herman. *Journal of Metals,* v. 8, sec. 2, *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Oct. 1956, p. 1353-1354.

Metal under consideration is the *A-B*, body-centered type, such as β brass. The slip system is taken to be [111], (110). (N10, Cu)

520-N. (Czech.) Some Remarks on the Crystallization of Metals. *Slévarenstvi,* v. 4, no, 9, Sept. 1956, p. 263-267.

Explains the influence of inclusions upon the structure of alloys and

mentions some methods of refining crystalline structure. (N12)

521-N. (French.) **Contribution to the Study of the Alterations in Steel Structures Caused by Fatigue.** A. Kochanovska, J. Cermak, and F. Holy. *Revue de Métallurgie,* v. 53, no. 9, Sept. 1956, p. 701-702.

Alterations studied by X-rays on low alloy steels. (N8, Q7, AY)

522-N. (Russian) **Structural Nonhomogeneity of Austenite Micrograin at Higher Temperatures.** V. I. Prosvirin. *Izvestiia Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk,* no. 9, Sept. 1956, p. 117-120.

Microhardness of austenite after quenching at 1250° C. and additional heating for 6 hr. Increase of nonhomogeneity with high temperature. (N8, Q29, ST)

523-N. (Russian.) **Physical Methods of Studying Low-Rate Transformations in High-Alloy Steel.** Ia. S. Gintsburg, Iu. M. Margolin and A. F. Sachavskii. *Zavodskaia Laboratoriia,* v. 22, no. 9, Sept. 1956, p. 1046-1052.

Advantages of the magnetic, X-ray crystal and chemical phase analyses for the investigation of fine transformations in nonmagnetic steels. (N8, M22, M23, AY)

524-N. (Russian.) **Evaluating the Degree of Dendritic Liquation of Carbon in Steel by the Microhardness Method.** I. N. Golikov and E. D. Mokhir. *Zavodskaia Laboratoriia,* v. 22, no. 9, Sept. 1956, p. 1052-1056.

Method of quantitative evaluation of the dendritic nonuniformity of carbon distribution in steels with up to 0.45% carbon by microhardness measurements. (N12, Q29, CN)

525-N. (Spanish.) **A Contribution to the Study of the Influence of the Physicochemical State of Fe-C Alloys on Spectral Emission. Spectrographic Determination of the Cementite Coalescence in Steels.** E. Asensi Alvarez-Arenas and G. del Olmo Vega. Paper from "XXVIII Congreso Internacional de Quimica Industrial". v. I. Saez, p. 521-526.

Coalescence is studied by a spectral method, based on the special value acquired by Δs according to the microstructural constituents and in relation to previous thermal treatment. (N8, ST)

526-N. Effect of Noncollimated Radiation on Surface Activity Methods for the Determination of Diffusion Coefficients in Solids. R. H. Condit and C. E. Birchenall. *Journal of Metals, v. 8; American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, sec. 2, Oct. 1956, p. 1341-1344.

Contributions or radiations arriving at a diffusion specimen surface, including angles other than 90°, were evaluated for a number of counting geometries. MnK α-radiation from iron-55 was used to obtain a monochromatic source of X-rays. (N1)

527-N. Structural Changes During the Aging in an Al-Mg-Zn Alloy. L. F. Mondolfo, N. A. Gjostein and D. W. Levinson. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, sec. 2, Oct. 1956, p. 1378-1385.

When aging at low temperatures (up to 200° C.) the precipitate which formed was $MgZn_2$; above 300° C., $(AlZn)_{49}Mg_{32}$; at intermediate temperatures both phases formed. (N7, M24, Al, Mg, Zn)

528-N. The Martensitic Transformation in the Iron-Nickel System. Larry Kaufman and Morris Cohen. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, sec. 2, Oct. 1956, p. 1393-1401.

The martensite-start temperature on cooling and the austenite-start temperature on heating in the iron-nickel system determined between 9.5 and 33.2 at. % nickel. (N8, Fe, Ni)

529-N. Matrix Phase in Lower Bainite and Tempered Martensite. F. E. Werner, B. L. Averbach and Morris Cohen. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, sec. 1, Oct. 1956, p. 1484.

Bainite formed near the M_s temperature bears a striking resemblance to martensite tempered at the same temperature as shown by the electron microscope. (N8)

530-N. (English.) **A Quantitative Study of the Formation of Austenite and the Solution of Cementite at Different Austenitizing Temperatures for a 1.27% Carbon Steel.** Göran Molinder. *Acta Metallurgica,* v. 4, no. 6, Nov. 1956, p. 565-571.

The course of transformation after rapid heating to temperatures above AC_1 investigated to quantitatively. (N8, CN)

531-N. (English.) **Precipitate Kinetics and Structure in a Cu-2.4% Fe Alloy.** J. M. Denney. *Acta Metallurgica,* v. 4, no. 6, Nov. 1956, p. 586-592.

Kinetics of the isothermal pre-

cipitation of Fe from a supersaturated solid solution of 2.4% Fe copper alloy in the temperature range 550 C. to 800° C. were obtained from measurements of the saturation magnetization of the specimens. (N7, Cu, Fe)

532-N. (English.) **The Formation of Low-Energy Interfaces During Grain Growth in Alpha and Alpha-Beta Brasses.** Hsun Hu and Cyril Stanley Smith. *Acta Metallurgica,* v. 4, no. 6, Nov. 1956, p. 638-646.

Measurements were made of the relative areas of types of interface observable in the microstructure. Interfaces across which two phases are related in orientation are common, and their fraction increases as grain size of duplex mixture increases. (N3, Cu)

533-N. (Russian.) **On the Lowering of Temperature at the Beginning of Martensite Transformation Due to Partial Decomposition of Austenite in the Bainite Range.** V. I. Arkharov, V. P. Skliuev and V. O. Esin. *Fizika Metallov i Metallovedenie,* v. 3, no. 1, 1956, p. 62-65.

Reviews problem and offers a new view of the connection between the temperature decrease and the decomposition of austenite. (N8, ST)

534-N. (Russian.) **The Kinetics of Growth of the Diffusion Layer in Boron Treatment of Steel.** V. D. Taran and L. P. Skugorova. *Fizika Metallov i Metallovedenie,* v. 3, no. 1, 1956, p. 66-69.

Studies diffusion of boron into low-alloy and carbon structural steels. Boron penetration follows the parabolic law of growth of the diffusion layer. (N1, AY)

535-N. (Russian.) **On the Diffusion Mobility of Atoms During the Fusion and Recrystallization of Metals.** P. L. Gruzin and A. D. Tiutiunnik. *Fizika Metallov i Metallovedenie,* v. 3, no. 1, 1956, p. 70-75.

Fusion and recrystallization have different threshold levels of diffusion mobility; the level in fusion is 10^{14} times higher than that in recrystallization. (N1, N5)

536-N. (Russian.) **On the Influence of High Pressure on Recrystallization in Copper.** V. I. Arkharov and D. K. Bulychev. *Fizika Metallov i Metallovedenie,* v. 3, no. 1, 1956, p. 76-78 + plate.

Suggests that relaxation processes in deformed crystals are at first retarded but later on attenuate at a slower rate than in the absence of pressure. (N5, Cu)

537-N. (Russian.) **On the Theory of the Polymorphism of Iron.** V. N. Svechnikov and A. G. Lesnik. *Fizika Metallov i Metallovedenie,* v. 3, no. 1, 1956, p. 87-96.

Phase equilibrium curves of solid solutions of iron agree well with curves of the second order; those calculated for the iron-chromium system are in good agreement with experimental data. (N6, Fe, Cr)

538-N. (Russian.) **On the Pearlite Transformation in Alloy Steels.** R. I. Entin. *Metallovedenie i Obrabotka Metallov,* no. 9, Sept. 1956, p. 3-9.

Crystallization parameters and carbide formation in the isothermal decomposition of austenite and the kinetics of the polymorphic transformation in iron. (To be continued.) (N8, AY)

539-N. (Russian.) **Migration of Hydrogen in Hard Steel Under the Influence of an Electric Field.** V. I. Iavoiskii and D. F. Chernega. *Stal',* v. 16, no. 9, Sept. 1956, p. 790-793.

Experimental data on high and medium-carbon and manganese steels show a gradual migration of hydrogen toward the cathode under the influence of a direct current. The amount transferred is insignificant and cannot serve for degasification of carbon and low or medium alloyed steels. (N12, ST)

540-N. (Russian.) **Effect of Ultrasonic Oscillations on the Processes in Metal Alloying.** N. T. Gudtsov and M. N. Gavze. *Zhurnal Neorganicheskoi Khimii,* v. 1, no. 7, July 1956, p. 1533-1538 + 1 plate.

Acceleration of processes of dispersion hardening. Experimental data. (N7)

SECTION P

PHYSICAL PROPERTIES and TEST METHODS

1-P. The Enthalpy and Heat Capacity of Magnesium and of Type 430 Stainless Steel From 700 to 1100° K. Daniel R. Stull and Richard A. McDonald. *American Chemical Society, Journal,* v. 77, Oct. 20, 1955, p. 5293.

Measurements in dropping calorimeter. Tables, graphs, equations. 3 ref. (P12, SS, Mg)

2-P. The Vapor Pressure of Rhenium. E. M. Sherwood, D. M. Rosenbaum, J. M. Blocher, Jr., and I. E. Campbell. *Electrochemical Society, Journal,* v. 102, Nov. 1955, p. 650-654.

Determination made over the temperature range of 2220 to 2725° C. Estimates made of its boiling point and of vapor pressure of liquid rhenium. Photograph, micrograph, tables, graph. 11 ref. (P12, Rh)

3-P. A Study of Transparent, Highly Conducting Gold Films. E. J. Gillham, J. S. Preston and Betty E. Williams. *Philosophical Magazine,* v. 46, 7th ser., no. 381, Oct. 1955, p. 1051-1068.

On bismuth oxide they show high electrical conductivity and optical transmission; possible use is as transparent coatings for de-icing aircraft windows by direct electrical heating. Tables, graph. 14 ref. (P15, P17, T24, Au, Bi)

4-P. Ultrasonic Attenuation in Metals. A. B. Pippard. *Philosophical Magazine,* v. 46, 7th ser., no. 381, Oct. 1955, p. 1104-1114.

Analyzed in terms of free-electron model of metal. 9 ref. (P10)

5-P. Thermodynamics of a Sheared Superconductor. A. B. Pippard. *Philosophical Magazine,* v. 46, 7th ser., no. 381, Oct. 1955, p. 1115-1118.

Carried out by torsion measurements on polycrystalline samples, work shows that rigidity modulus differs in normal and superconducting states of tin by an amount which varies with temperature. Diagram. 3 ref. (P12, Sn)

6-P. (English.) **On the Origin of Magnetic Anisotropy Induced by Magnetic Annealing.** Soshin Chikazumi and Tatsuro Oomura. *Physical Society of Japan, Journal,* v. 10, no. 10, Oct. 1955, p. 842-849.

Anistropy occurs if dipole-dipole interaction differs with different sorts of atomic pairs. Table, graphs. 14 ref. (P16, J23, Fe, Ni)

7-P. (English.) **Activity of Aluminum in Liquid Ag-Al, Fe-Al, Fe-Al-C, and Fe-Al-C-Si Alloys.** J. Chipman and T. P. Floridis. *Acta Metallurgica,* v. 3, no. 5, Sept. 1955, p. 456-457.

Experimental data on distribution of aluminum between liquid iron and silver at 1600° C. are presented; effects of carbon and silicon in iron. Graphs, tables. 8 ref. (P12, Fe, Al)

8-P. (English.) **The Magnetic Properties and Phase Diagram of Iron Tellurium System.** Shoko Chiba. *Physical Society of Japan, Journal,* v. 10, no. 10, Oct. 1955, p. 837-842.

Thermal analysis and X-ray showed that many intermetallic compounds are formed from melt through peritectic reactions, and an eutectoid reaction occurs between two compounds at 520° C. Graphs, table. 8 ref. (P16, M24, Fe, Te)

9-P. (French.) **Contribution to the Study of the Thermodynamic Properties of Copper-Platinum Alloys.** P. Assayag. *Annales de chimie (Paris),* v. 10, July-Aug. 1955, p. 637-665.

Chemical equilibrium measurements used to study the thermodynamic properties of the alloys and their oxidation by oxygen. Graphs, tables. 27 ref. (P12, R2, Cu, Pt)

10-P. (German.) **Dielectric Properties of Iron Under Very Low Frequency**

and Under Influence of Front Area. H. Gränicher, C. Jaccard, P. Scherrer and A. Steinemann. *Helvetica Physica Acta,* v. 28, no. 4, 1955, p. 300-303.

Gives data of the above with a suggestion to further investigation. Graphs. 4 ref. (P15, Fe)

11-P. (German.) **Manganese Interference Points in Gray Tin.** G. Busch and K. A. Müller. *Helvetica Physica Acta,* v. 28, no. 4, 1955, p. 319-320.

Data of experimental work in the range of 90 to 260° K. Graph. 7 ref. (P15, Mn, Sn)

12-P. A Survey of Irradiation Effects in Metals. J. W. Glen. *Advances in Physics,* v. 4, Oct. 1955, p. 381-478.

Effects on structure and on mechanical and physical properties; theory, correction of radiation damage by annealing. Graphs, tables. 196 ref. (P10, Q general, J23)

13-P. Effect of Carbon on Interfacial Tension of Iron With Slag. S. I. Popel, O. A. Esin and Yu. P. Nikitin. *Henry Brutcher Translation No.* 3116, 5 p. (From *Doklady akademii nauk SSSR,* v. 88, no. 2, 1952, p. 253-255.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 426-P, 1953. (P10, Fe)

14-P. Determination of Surface Tension of Some Cast and Pig Irons. K. Grütter and B. Marincek. *Henry Brutcher Translation No.* 3577, 7 p. (From *Schweizer archiv,* v. 19, no. 6, 1953, p. 171-173.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 426-P, 1953. (P10, Fe)

15-P. Surface Tension of Liquid Iron-Carbon Alloys. P. Kozakévich, S. Chatel and M. Sage. *Henry Brutcher Translation No.* 3578, 5 p. (Abridged from *Comptes rendus,* v. 236, May 27, 1953, p. 2064-2066.) Henry Brutcher, Altadena, Calif.

Measured at 1450° C. for alloys with 1 to 5% carbon, and at 1530° C. for alloys with less than 1% carbon. Results compared with published data. Graph. 3 ref. (P10, ST)

16-P. (Russian.) **New Phenomenological Theory of Superconductivity.** Iu. L. Klimontovich. *Doklady akademii nauk SSSR,* v. 104, no. 3, Sept. 21, 1955, p. 384-386.

Considers surface energy at boundary of the superconductive and normal phases of a metal. 2 ref. (P15)

17-P. (Russian.) **Effect of Sheet Thickness on the Magnetic Characteristics of Soft Magnetic Alloys.** E. I. Gurvich and E. Kondorskii. *Doklady akademii nauk SSSR,* v. 104, no. 4, Oct. 1, 1955, p. 530-532.

Decreasing sheet thickness of these alloys decreases magnetic penetrability and increases coercive force and hysteresis losses. Specimens of molybdenum permalloy and 50% permalloy, prepared in three ways, tested for this effect. Table, graph, micrographs. 5 ref. (P16, SG-p, Ni, Mo)

18-P. (Russian.) **Effect of the Form of Carbon on Magnetic Properties of Transformer Steel.** I. N. Bogachev, V. A. Koroleva and M. I. Sherstiuk. *Fizika metallov i metallovedenie,* v. 1, no. 1, 1955, p. 149-157.

Effect of distribution pattern of structurally free cementite, of cementite and graphite, aging of supersaturated alpha-solution on coercive force. Graphitization and normalization. Tables, micrographs, graphs. (P16, J24, N8, ST)

19-P. (Russian.) **Thermionic Emission Properties of Thin Thorium and Thorium Oxide Films on Metallic Foundations.** A. R. Shul'man and A. P. Rumiantsev. *Zhurnal tekhnicheskoi fiziki,* v. 25, no. 11, Oct. 1955, p. 1898-1909.

Results of measurements of films on platinum and molybdenum bases. Relation of thermionic emission current to time at oxidized cathodes during activation. Diagrams, tables, graphs. 7 ref. (P15, Th)

20-P. Measurement of Total Emissivities of Gas-Turbine Combustor Materials. S. M. De Corso and R. L. Coit. *ASME, Transactions,* v. 77, Nov. 1955, p. 1189-1196, disc., p. 1196-1197.

Data included showing emissivity of several metals and ceramic coatings as functions of temperature, surface treatment and previous history of the material. Diagram, graphs, table. 8 ref. (P17)

21-P. The Fluctuating Field Model of Ferromagnetisin With Particular Reference to Nickel. F. D. Stacey. *Canadian Journal of Physics,* v. 33, Nov. 1955, p. 661-667.

Following Néel's calculations of fluctuations in intermolecular field, a model is suggested in which there is a mutual repulsion of elementary magnets, so that spontaneous magnetization, in the case of nickel, is affected by a process of ordering of the magnets on the lattice sites as well as in orientation. Table. 15 ref. (P16, Ni)

22-P. High-Frequency Silicon-Aluminum Alloy Junction Diodes. M. B. Prince. *Institute of Radio Engineers, Transactions on Electron Devices,* v. ED-2, Oct. 1955, p. 8-9.

Silicon-aluminum alloy junction diodes were made that have rectifying properties up to frequencies of 500 Mc. per sec. Recovery times from storage effects are of the order of 0.1 μ sec. Graph, diagrams. 6 ref. (P15, Al, Si)

23-P. Grüneisen's Constant for Some Metals. J. J. Gilvarry. *Journal of Chemical Physics,* v. 23, Oct. 1955, p. 1925-1927.

Redetermined from compressibility parameters for lithium, sodium and potassium to show good agreement with values from Grüneisen's law. Some anomalies for other metals are adjusted. Tables. 20 ref. (P10, EG-e)

24-P. Activation Cross Sections of Y_{90} and Pr_{142}. R. R. Smith and S. D. Reeder. *Journal of Chemical Physics,* v. 23, Nov. 1955, p. 2108-2110.

The irradiation of Y_{89} and Pr_{141} under sufficiently high thermal neutron flux produces small amounts of Y_{91} and Pr_{143}. Graphs. 13 ref. (P10, Y, Pr)

25-P. The Melting Point of Germanium as a Function of Pressure to 180,000 Atmospheres. H. Tracy Hall. *Journal of Physical Chemistry,* v. 59, Nov. 1955, p. 1144-1146.

Melting point decreases linearly from 936° C. at one atmosphere to 347° C. at 180,000 atmospheres. No new solid phases form in this region. Tables. (P12, Ge)

26-P. The Low Temperature (11-20° K.) Specific Heat of Alpha and Beta Manganese. G. L. Booth, F. E. Hoare and B. T. Murphy. *Physical Society, Proceedings,* v. 68, no. 431B, Nov. 1, 1955, p. 830-832.

Specific heat of alpha Mn varies from 0.19 joule $mole^{-1}$ deg^{-1} at 12° K. to 0.49 joule $mole^{-1}$ deg^{-1} at 20° K.; the corresponding values for beta Mn are 0.62 joule $mole^{-1}$ deg^{-1} and 1.18 joule $mole^{-1}$ deg^{-1}. Graphs. 8 ref. (P12, Mn)

27-P. The Thermal Effects Associated With the Magnetization of High-Coercivity Materials. L. F. Bates and A. W. Simpson. *Physical Society, Proceedings,* v. 68, no. 431B, Nov. 1, 1955, p. 849-858.

Heat changes accompanying magnetization processes in materials of high coercivity over a field range of 4000 oersteds. Diagrams, graphs, tables. 8 ref. (P16)

28-P. The Magnetic Susceptibility of Metallic Cerium. L. F. Bates, S. J. Leach and R. G. Loasby. *Physical Society, Proceedings,* v. 68, no. 431B, Nov. 1, 1955, p. 859-861.

Measurements at 90 to 1057° K. Graph. 12 ref. (P16, Ce)

29-P. The Influence of Pressure on Metal-Germanium Contacts. J. Lees and S. Walton. *Physical Society, Proceedings,* v. 68, no. 431B, Nov. 1, 1955, p. 922-928.

Dependence of the electrical properties of the germanium immediately below a point contact on the stress existing in this region investigated. Graphs, 9 ref. (P15, Q25, Ge)

30-P. The Hall Effect in Metals at High Frequencies. B. Donovan. *Physical Society, Proceedings,* v. 68, no. 431A, Nov. 1955, p. 1026-1032.

Theory of the Hall effect at high frequencies is developed in terms of the "surface Hall coefficient" defined in a similar manner to the complex surface impedance for metals. Calculations of this coefficient are carried through for a metal with two overlapping energy bands, and the variations with frequency and with field strength shown graphically for certain special cases. Graphs. 8 ref. (P15)

31-P. Calculation of Magnetostriction Constants for Nickel. G. C. Fletcher. *Physical Society, Proceedings,* v. 68, no. 431A, Nov. 1955, p. 1066-1071.

Calculations based on the collective electron model. 6 ref. (P16, Ni)

32-P. The Surface Resistance of Normal and Superconducting Tin at 36 kMc/s. E. Fawcett. *Royal Society, Proceedings,* v. 232, ser. A, Nov. 22, 1955, p. 519-537 + 1 plate.

A new calorimetric method developed to measure the surface resistance of plane single crystals of tin. Diagram, tables, graphs. 23 ref. (P15, Sn)

33-P. Physical Metallurgy of Zirconium and Its Alloys. A. R. Kaufmann and T. T. Magel. Paper from "The Metallurgy of Zirconium". National Nuclear Energy Series, Division VII—v. IV. McGraw-Hill Book Co., p. 348-431.

Thermal, electrical and elastic properties, crystal structure and transformations, diffusion, deformation texture. Photographs, micrographs, tables, diagrams, graphs. 138 ref. (P11, P15, Q21, M26, N general, Zr)

34-P. Superconductivity of Zirconium Alloys. B. T. Matthias and E. Corenzwit. *Physical Review,* v. 100, ser. 2, Oct. 15, 1955, p. 626-627.

Superconducting transition temperatures of alloys between zirconium and VIIIth column elements are substantially higher than those of zirconium. The same is true for zirconium-gold alloys. Graphs, table. 2 ref. (P15, Zr)

35-P. Faraday Effect in Germanium at Room Temperature. Richard R. Rau and M. E. Caspari. *Physical Review*, v. 100, ser. 2, Oct. 15, 1955, p. 632-639.

Room-temperature measurements of the angle of rotation of elliptically polarized radiation, at microwave frequencies on both *n*- and *p*-type samples of germanium, gave values of 3780 sq. cm. per volt-sec. and 3300 sq. cm. per volt-sec. for the electron and hole mobilities, respectively. Tables, diagrams. 22 ref. (P15, P16, Ge)

36-P. Search for the Hall Effect in a Superconductor. II. Theory. H. W. Lewis. *Physical Review*, v. 100, ser. 2, Oct. 15, 1955, p. 641-645.

Various theoretical explanations for the absence of a Hall effect in a superconductor are considered, but none are found convincing. It is concluded that this property lies outside the existing body of theory, and the general requirements it imposes on a future theory are adduced. 9 ref. (P15)

37-P. Relative Absorption of 10 Mc. per sec. Longitudinal Sound Waves in a Superconducting Polycrystalline Tin Rod. L. Mackinnon. *Physical Review*, v. 100, ser. 2, Oct. 15, 1955, p. 655-659.

Relative absorption of 10 Mc. per sec. sound pulses studied between 1.5 and 3.73° K. (the transition temperature) in superconducting polycrystalline tin and above 3.73 to 4.2° K. in the normal metal. Diagrams, photographs, graphs. 14 ref. (P10, Sn)

38-P. Properties of Germanium Doped With Manganese. H. H. Woodbury and W. W. Tyler. *Physical Review*, v. 100, ser. 2, Oct. 15, 1955, p. 659-662.

Temperature dependence of the electrical resistivity and Hall coefficient in *p*- and *n*-type manganese-doped germanium crystals indicates that manganese introduces two acceptor levels in germanium. Graphs. 8 ref. (P15, Ge)

39-P. Electrical and Optical Properties of Intermetallic Compounds. IV. Magnesium Stannide. R. F. Blunt, H. P. R. Frederikse and W. R. Hosler. *Physical Review*, v. 100, ser. 2, Oct. 15, 1955, p. 663-666.

Determinations of conductivity, Hall effect, optical absorption, photoconductivity. Graphs, table. 16 ref. (P15, P17, Mg, Sn)

40-P. Effect of Point Imperfections on the Electrical Properties of Copper. II. Thermoelectric Power. F. J. Blatt. *Physical Review*, v. 100, ser. 2, Oct. 15, 1955, p. 666-670.

The changes in the thermoelectric power of copper due to the presence of interstitials and vacancies were calculated in the free electron approximation. It was found that the changes for concentrations of defects encountered in experiments on radiation damage due to massive charged particles are, at liquid nitrogen temperature, of the same magnitude as the absolute thermo-electric power of pure copper. Graphs. 18 ref. (P15, Cu)

41-P. Magnetic Domains in Thin Films of Nickel-Iron. Charles A. Fowler, Jr., and Edward M. Fryer. *Physical Review*, v. 100, ser. 2, Oct. 15, 1955, p. 746-747.

By employing the longitudinal Kerr magneto-optic method of domain observation, photographs were made of the domain structure of an evaporated nickel-iron film (80% nickel) 5000 A. thick, measuring 1-in. × 1¼ in. on the surface. Photographs. 8 ref. (P16, Ni, Fe)

42-P. Ultrasonic Attenuation in Superconducting and Normal-Conducting Tin at Low Temperatures. H. E. Bömmel. *Physical Review*, v. 100, ser. 2, Oct. 15, 1955, p. 758-759.

Measurements carried out in single crystals of tin of two different purities at 2 to 19° K. and in magnetic fields of various strengths. Graphs. 6 ref. (P10, P16, Sn)

43-P. Ferromagnetic Domains in Permanent Magnet Materials. L. F. Bates. *Research*, v. 8, Dec. 1955, p. 462-472.

An account of the domain concept and its application to ferromagnetic metals. Special attention given to powder patterns observed on surfaces of Alnico and columnar Alcomax. Diagrams, photographs, micrographs. 3 ref. (P16, SG-n)

44-P. Miscellaneous Effects of Pressure on Miscellaneous Substances. P. W. Bridgman. *American Academy of Arts and Sciences*, v. 84, no. 1, p. 111-129.

Electrical resistance, compression, shearing strength, tensile properties and permanent density change of various materials. Tables, photograph. 17 ref. (P15, Q28, Q23, P10, Y, Re, Tc, Sr, Cr, Ge, Pb)

45-P. Photoconduction in Germanium and Silicon. M. L. Schultz and G. A. Morton. *I. R. E., Proceedings,* v. 43, Dec. 1955, p. 1819-1828.

Intrinsic response of crystals extends through the entire visible spectrum into the near infra-red, but doped, with appropriate foreign atoms and operated at low temperatures, they are effective impurity photoconductors with response extending into the far infra-red. Diagrams, graphs, tables. 58 ref. (P15, P17, Ge, Si)

46-P. Photoeffects in Intermetallic Compounds. H. P. R. Frederikse and R. F. Blunt. *I. R. E., Proceedings,* v. 43, Dec. 1955, p. 1828-1835.

Classification of the compounds according to crystal structure and to position of component elements in the periodic system. Surveys properties of compounds with zinc blende and fluorite lattice. Tables, graphs, diagram. 40 ref. (P17, M26, Zn)

47-P. Photoconductivity of the Sulfide, Selenide, and Telluride of Zinc or Cadmium. R. H. Bube. *I. R. E., Proceedings,* v. 43, Dec. 1955, p. 1836-1850.

Preparation of photoconductors as evaporated, powder or sintered layers, and as single crystals. Investigation of several photoconductivity phenomena clarifying the nature of the photon and electron processes in the photoconductors. Photograph, diagrams, tables, graphs. 118 ref. (P15, P17, Zn, Cd, Se, Te)

48-P. Performance of Photoconductors. Albert Rose. *I. R. E., Proceedings,* v. 43, Dec. 1955, p. 1850-1869.

A phenomenological analysis of the process whereby the conductivity of a material is increased by exposure to radiation. Diagrams, graph. 54 ref. (P15, P17)

49-P. Lead Salt Photoconductors. T. S. Moss. *I. R. E., Proceedings,* v. 43, Dec. 1955, p. 1869-1881.

Manufacture of cells and processing photosensitive layers; response time, sensitivity and spectral distribution of sensitivity of the final detectors; factors determining maximum attainable sensitivity; fundamental semiconducting properties of lead sulfide, telluride and selenide; theory of photo-effects in layers. Diagrams, graphs, tables. 130 ref. (P15, P17, Pb)

50-P. Dynamic Determination of the Compressibility of Metals. Roy W. Goranson, Dennison Bancroft, Blendin L. Burton, Theodore Blechar, Edwin E. Houston, Elisabeth F. Gittings and Stanley A. Landeen. *Journal of Applied Physics,* v. 26, Dec. 1955, p. 1472-1479.

Theory is presented which allows comparison with data obtained by other experimenters, and which yields the relationship between pressure and compression either at constant entropy or constant temperature. Diagrams, tables, graphs. 1 ref. (P10, Al)

51-P. Total Emissivities and Absorptivities of Some Commercial Surfaces at Room and Liquid-Nitrogen Temperatures. F. J. Zimmermann. *Journal of Applied Physics,* v. 26, Dec. 1955, p. 1483-1488.

Determination of design values for the emissivities and absorptivities of surfaces that could be obtained commercially on reasonably large equipment. Diagrams, tables, graphs. (P17)

52-P. Study of Metal-Ceramic Interactions at Elevated Temperatures. F. H. Norton and W. D. Kingery. *Massachusetts Institute of Technology (U. S. Atomic Energy Commission),* NYO-4632, Oct. 1955, 7 p.

An increase of surface tension from 250 dynes per cm. at 1150° C. to 263 dynes per cm. at 1400° C. occurs in liquid germanium dioxide. Pure nickel has a negative temperature coefficient of surface tension. Graphs, table. (P10)

53-P. Broadening of Impurity Levels in Silicon. Melvin Lax and Elias Burstein. *Physical Review,* v. 100, ser. 2, Oct. 15, 1955, p. 592-602.

Sharp absorption lines have been observed in *p*- and *n*-type silicon whose absolute and relative positions lead to their interpretation as optical transitions between bound states of trapped holes of electrons which are approximately hydrogenic in character. Graphs. 13 ref. (P15, Si)

54-P. Plasma Resonance in Crystals: Observations and Theory. G. Dresselhaus, A. F. Kip and C. Kittel. *Physical Review,* v. 100, ser. 2, Oct. 15, 1955, p. 618-625.

Simplified theory of resonance in a magnetic field in semiconductor crystals for carriers having a single isotropic effective mass. Graphs. 15 ref. (P15, P16, In, Sb)

55-P. Effect of Pressure on the Electrical Resistance of Metals at Liquid Helium Temperatures. J. Hatton. *Physical Review,* v. 100, ser. 2, Oct. 15, 1955, p. 681-684.

In order to determine the nature of the electron-lattice interaction, an investigation was made of the

influence on the low-temperature electrical conductivity of metals when lattice spacings are changed by pressure. Graphs. 4 ref. (P15, M26)

56-P. On the Theory of Thermal Conductivity of Monovalent Metals. Tadao Kasuya. *Progress of Theoretical Physics,* v. 13, June 1955, p. 561-570.

Mathematical analysis and discussion of theories. Graphs. 8 ref. (P11)

57-P. (English.) **Thermodynamical Theory of Galvanomagnetic and Thermomagnetic Phenomena.** R. Fieschi. *Nuovo cimento (Supplemento),* v. 2, ser. 10, no. 4, Sept. 1955, p. 1168-1170.

Mathematical analysis. 4 ref. (P12, P16)

58-P. (English.) **The Spontaneous Hall Effect in Ferromagnetics. I.** J. Smit. *Physica,* v. 21, no. 11, Nov. 1955, p. 877-887.

Existing theories on the origin of the effect are invalid, and it is shown that the explanation has to be based on the anisotropic scattering, caused by spin-orbit interaction, of the conducting electrons against the imperfections of the lattice. Diagram, graphs, table. 15 ref. (P15, Fe)

59-P. (French.) **Variation of Viscosity of Metallic Wires With Temperature.** Constantin Salceanu. *Comptes rendus,* v. 241, no. 20, Nov. 14, 1955, p. 1384-1386.

Study of the effect of temperature on the viscosity of iron wire, working with a moment of inertia of 970 g. per sq.cm. Table. 4 ref. (P10, Fe)

60-P. (French.) **Viscosity and Internal Friction in Metallic Wires.** Constantin Salceanu. *Comptes rendus,* v. 241, no. 22, Nov. 28, 1955, p. 1554-1555.

Measurement determination in steel and aluminum wires. 3 ref. (P10, Q22, ST, Al)

61-P. (German.) **The Reduced Normal Curve of Ferro-Magnetic Alloys.** Jakob Kranz and Claus Bodewig. *Zeitschrift für Physik,* v. 142, no. 4, 1955, p. 396-400.

Magnetic properties of copper-nickel alloys at various temperatures. Graphs. 7 ref. (P16, Cu, Ni)

62-P. (Russian.) **Effect of Small Addition on Galvanomagnetic Properties of Bismuth.** N. E. Alekseevskii, N. B. Brandt and T. I. Kostina. *Doklady akademii nauk SSSR,* v. 105, no. 1, Nov. 1, 1955, p. 46-49.

Effect of pressure up to 1750 atmospheres on properties of bismuth with various contents of tin and tellurium. Graphs. 8 ref. (P15, P16, Bi)

63-P. (Russian.) **Nature of Electric Conductivity Change in Case of Staggered Deformation of Metal Monocrystals.** V. N. Rozhanskii, Iu. V. Goriunov and O. D. Shchukin. *Doklady akademii nauk SSSR,* v. 105, no. 1, Nov. 1, 1955, p. 80-82.

Study of electric conductivity changes in zinc of 99.99% purity during deformation. Diagram, graph. 4 ref. (P15, Zn)

64-P. (Russian.) **Zero-Charge Potentials of Copper and Chromium.** E. A. Ukshe and A. I. Levin. *Doklady akademii nauk SSSR,* v. 105, no. 1, Nov. 1, 1955, p. 119-122.

Method of measuring potentials by means of bubble position on the electrode. Graphs, photographs. 12 ref. (P15, Cr, Cu)

65-P. (Russian.) **Properties and Structure of Ternary Semiconducting Systems. II. Electrical Properties and Structure of Materials in the System Thallium, Antimony, and Arsenic.** N. A. Goriunova and B. T. Kolomiets. *Zhurnal tekhnicheskoi fiziki,* v. 25, no. 12, Oct. 1955, p. 2069-2078.

Discusses composition as a factor in the determination of structural and property changes. Tables, graphs, diagram. 4 ref. (P15, M24, Th, Sb, As)

66-P. (Russian.) **Certain Peculiarities of Temperature Dependence of Density and Electroconductivity of the Liquid Melts Tellurium-Selenium.** N. P. Mokrovskii and A. R. Regel'. *Zhurnal tekhnicheskoi fiziki,* v. 25, no. 12, Oct. 1955, p. 2093-2096.

Data in experimental investigation of temperature dependence presented in tabulated and charted form. Critical analysis of data. Graphs, tables. 14 ref. (P10, P15, Te, Se)

67-P. (Russian.) **Electrical Propertie of Zinc Telluride.** B. I. Boltaks, O. A. Matveev and V. R. Savinov. *Zhurnal tekhnicheskoi fiziki,* v. 25, no. 12, Oct. 1955, p. 2097-2103.

Influence of temperature on electroconductivity, thermo-electromotive force, and on concentration and mobility of current carriers. Table, graphs. 11 ref. (P15, Zn, Te)

68-P. Thermal Cycling Equipment. R. M. Mayfield and S. T. Zegler. *Argonne National Laboratory, Metallurgy Division (U. S. Atomic Energy Commission),* ANL-4848, Nov. 1951, 26 p.

Design and construction of an induction cycling unit, a vertical tube unit (Woosher), and a low-temperature unit (Wig Wag), built at Ar-

gonne National Laboratory for studying effect of thermal cycling on the dimensional stability of uranium. Photographs, diagrams, graphs, table. (P11, P10, U)

69-P. Technical Properties of Iron Powder Magnets. E. H. Carman. *British Journal of Applied Physics,* v. 6, Dec. 1955, p. 426-429.

Measurements of coercive force, remanence and maximum energy product of iron compacts as functions of density packing and X-ray particle size. Graphs, tables. 9 ref. (P16, H11, Fe)

70-P. Effects of Processing on Magnetic Alloys. Robert H. Trapp. *Electrical Manufacturing,* v. 57, Jan. 1956, p. 110-113.

Variables in processing steps which control the physical and magnetic properties of magnetic alloys. Graph, micrographs. (P16, SG-n, p)

71-P. A General Approach to Hysteresis. IV. An Alternative Formulation of the Domain Model. D. H. Everett. *Faraday Society, Transactions,* v. 51, Nov. 1955, p. 1551-1557.

Compares various approaches to the representation of hysteresis systems in terms of a domain model, provides simple method of expressing equations for scanning curves within a hysteresis loop. Graphs. 8 ref. (P16)

72-P. Thermodynamics of Carbon in Iron Alloys. I. Solubility of Carbon in Fe-P, Fe-Si and Fe-Mn Melts. II. Influence of Silicon on Activity Coefficient of Carbon Dissolved in Molten Iron. III. Solubility of Carbon in Fe-S Melts. IV. Solubility of Carbon in Fe-Si-P Melts. E. T. Turkdogan, L. E. Leake and R. A. Hancock. *Iron & Steel,* v. 28, Nov. 30, 1955, p. 567-574.

Includes tables, diagram, graphs. (P12, Fe)

73-P. The Barkhausen Effect. R. S. Tebble. *Physical Society, Proceedings,* v. 68, no. 432B, Dec. 1955, p. 1017-1032.

Critical examination of the elementary processes usually considered responsible for the discontinuous and irreversible domain boundary movements associated with the Barkhausen effect. Diagrams, graphs. 9 ref. (P16, Fe)

74-P. Some Electrical Effects of the Adsorption of Water Vapour by Anodized Aluminium. A. C. Jason and J. L. Wood. *Physical Society, Proceedings,* v. 68, no. 432B, Dec. 1955, p. 1105-1116.

Resistance and capacity of porous anodized aluminum oxide layers related to adsorption of water on the surface of the pores. Diagrams, graphs, tables. 14 ref. (P13, P15, L19, Al)

75-P. The Thermo-Electric Power of Monovalent Metals. H. Jones. *Physical Society, Proceedings,* v. 68, no. 432A, Dec. 1955, p. 1191-1193.

Thermo-electric power of the noble metals is very sensitive to the form of the Fermi surface and therefore is not necessary to have the conditions usually associated with "hole conduction" to obtain a positive value. Diagrams. 2 ref. (P15, Cu, Ag, Au, Li)

76-P. (English.) **The Heats of Formation of Some Transition Metal Silicides.** D. A. Robins and I. Jenkins. *Acta Metallurgica,* v. 3, no. 6, Nov. 1955, p. 598-604.

Data show that lower silicides are, in most cases, more stable than the disilicides, and that the highest heats of formation are to be found in Group IVa. Diagram, tables. 13 ref. (P12, Ti, Zr, Th, V, Ta, Mo, W)

77-P. (English.) **Residual Magnetization and Magnetostriction of Nickel Single Crystals.** Yoji Nakamura. *Physical Society of Japan, Journal,* v. 10, no. 11, Nov. 1955, p. 937-941.

By use of long cylindrical single crystals of pure nickel with various crystallographic orientations, magnetization and magnetostriction were measured at room temperature. Magnetostriction curves constructed theoretically from the obtained values of magnetostriction constants agree with the experimental curves. Diagrams, tables. 12 ref. (P16, Ni)

78-P. (English.) **A Theory of the Uniaxial Ferromagnetic Anisotropy Induced by Magnetic Annealing in Cubic Solid Solutions.** Satoshi Taniguchi. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 7, no. 3, June 1955, p. 269-281.

A solid solution may yield an anisotropic equilibrium distribution of solute atom pairs at temperatures below the Curie temperature. This may cause an additional ferromagnetic anisotropy having a lower-than-cubic symmetry. Results obtained from calculating uni-axial ferromagnetic anisotropy induced by magnetic annealing agree with available experimental data. Graphs, tables. 21 ref. (P16)

79-P. (German.) **Treatment of Light-Alloy E AlMgSi.** E. Nachtigall and H. Landerl. *Aluminium Ranshofen, Mitteilungen,* v. 3, no. 2, Oct. 1955, p. 40-43.

Mechanical and physical proper-

ties of light wire, soft and liquid annealing, cold and hot age hardening. Graphs.

(P general, Q general, J27, Al)

80-P. (Japanese.) Distribution Equilibrium of Chromium Between Molten Pig Iron and Slag. Toshio Niinomi, Yukio Matsushita and Kuro Kanamori. *Iron & Steel Institute of Japan, Journal,* v. 41, no. 10, Oct. 1955, p. 1075-1081.

Results of study on reduction equilibrium of chromium in the temperature range from 1350 to 1500° C. and the slag basicity CaO/SiO_2 ranging from 0.6 to 1.4 under one atmosphere pressure of carbon monoxide. Graphs, tables, diagram. 13 ref. (P12, D1, Cr,Fe)

81-P. (Russian.) Connection Between the Potential of Zero Charge and Physical-Chemical Characteristics of Metals. V. M. Novakovskii, E. A. Ukshe and A. I. Levin. *Zhurnal fizicheskoi khimii,* v. 24, no. 10, Oct. 1955, p. 1847-1853.

On the basis of contemporary theory of electrode potential, equations are derived which relate the potential of zero charge with other physical-chemical characteristics. Tables. 13 ref. (P15)

82-P. Heat Capacity of Erbium From 15 to 320° K. R. E. Skochdopole, Maurice Griffel and F. H. Spedding. *Journal of Chemical Physics,* v. 23, Dec. 1955, p. 2258-2263.

Thermodynamic functions were calculated and three maxima observed which occur at 19.9, 53.5, and 84° K. Correlation of the various contributions to the entropy at room temperature was made and extended to the other rare earth metals. Tables, graphs. 19 ref. (P12, Er)

83-P. On the Optical Properties of Solids. Herbert B. Rosenstock. *Journal of Chemical Physics,* v. 23, Dec. 1955, p. 2415-2421.

Treatment of the usual linear theory of lattice vibrations in ionic crystals, without the use of the simplifying cyclic boundary conditions, leads to an electric moment associated with each normal frequency which is a quasicontinuous function of the propagation vector. Diagram, table. 20 ref. (P17)

84-P. Effect of Shape Anisotropy on the Coercive Force of Elongated Single-Magnetic-Domain Iron Particles. T. O. Paine, L. I. Mendelsohn and F. E. Luborsky. *Physical Review,* v. 100, ser. 2, Nov. 15, 1955, p. 1055-1059.

Particles, 150 A. in diameter, have been prepared with properties that definitely confirm the existence of a shape anisotropy effect on coercive force. Micrographs, diagrams. 31 ref. (P16, Fe)

85-P. An Approach to Elognated Fine-Particle Magnets. I. S. Jacobs and C. P. Bean. *Physical Review,* v. 100, ser. 2, Nov. 15, 1955, p. 1060-1067.

Coercive force predicted by theory for single-domain particles with shape anisotropy frequently far exceeds the observed value. Several approximate models suggested which may exist in certain experimental situations. Detailed calculations presented for a "chain-of-spheres" model remagnetizing by several mechanisms. Diagrams, tables, graphs. 22 ref. (P16, Fe)

86-P. Electrical Properties of Near-Degenerate Boron-Doped Silicon. R. O. Carlson. *Physical Review,* v. 100, ser. 2, Nov. 15, 1955, p. 1075-1078.

Measurements of extrinsic resistivity and Hall effect have been carried out for a group of silicon single crystals containing a wide range of boron concentration, with particular stress on samples in the near-degenerate range, 10^{18} to 10^{19} boron atoms per cc. Graphs, table. 10 ref. (P15, Si)

87-P. Mean Free Path for Discrete Electron Energy Losses in Metallic Foils. A. W. Blackstock, R. H. Ritchie and R. D. Birkoff. *Physical Review,* v. 100, ser. 2, Nov. 15, 1955, p. 1078-1083.

Energy losses studied as a function of incident energy. In foils of aluminum, magnesium and copper, bombarded with electrons of energies 25 to 115 k.e.v., the losses appear at multiples of 14.9 and 10.7 e.v., respectively, for aluminum and magnesium, whereas only one loss is found in copper at 22.6 e.v. The mean free paths for the losses are determined for the three metals. Table, graphs. 26 ref. (P12, Al, Mg, Cu)

88-P. Magnetic Susceptibility of Germanium. D. K. Stevens, J. W. Cleland, J. H. Crawford, Jr., and H. C. Schweinler. *Physical Review,* v. 100, ser. 2, Nov. 15, 1955, p. 1084-1093.

Magnetic behavior of a variety of specimens measured as a function of temperature over the range from 70 to 300° K. Measurements also made on one *n*-type specimen bombarded with fast neutrons. Graphs, tables. 34 ref. (P16, Ge)

89-P. Recombination Processes in Tellurium. David Redfield. *Physical Review,* v. 100, ser. 2, Nov. 15, 1955, p. 1094-1100.

Recombination processes in tellurium investigated by photo conductivity techniques. Studies on single crystals having acceptor densities of about 10^{16} per cc. By using pulsed illumination, the decay time constant of the photocurrent was found to be 20μ sec., in fairly good agreement with results obtained previously from steady-state photocurrent sensitivity. Diagrams. 18 ref. (P15, Te)

90-P. Influence of Crystalline Electric Fields on Antiferromagnetic Transitions. L. D. Roberts, R. B. Murray and J. W. T. Dabbs. *Physical Review*, v. 100, ser. 2, Nov. 15, 1955, p. 1100-1103.

Treatment of Van Vleck is extended to include a crystalline electric field term, through use of the effective spin Hamiltonian. Diagram. 12 ref. (P16, Mn Gd, Cr, V)

91-P. Soft X-Ray Absorption of Tellurium and Vitreous and Metallic Selenium. M. Parker Givens, Charles J. Koester and William L. Goffe. *Physical Review*, v. 100, ser. 2, Nov. 15, 1955, p. 1112-1115.

The absorption of metallic selenium is compared with that of the vitreous form in the region from 200 to 240 A. For these two forms of selenium and for tellurium, the absorption band is separated into two component bands. This has led to a revised estimate of 1.2 e.v. for the separation of the M_{IV} and M_V levels of selenium and 1.6 e.v. for the separation of the N_{IV} and N_V levels of tellurium. Diagrams, table. 9 ref. (P12, M26, Te, Se)

92-P. Conductivity, Hall Effect, and Magnetoresistance in *n*-Type Germanium, and Their Dependence on Pressure. George B. Benedek, William Paul and Harvey Brooks. *Physical Review*, v. 100, ser. 2, Nov. 15, 1955, p. 1129-1139.

Examination of the galvanomagnetic properties using the application of high hydrostatic pressure as a means of varying the energy-band structure. Diagrams, tables. 22 ref. (P15, Ge)

93-P. Magnetic Susceptibility of Sodium Metal. Raymond Bowers. *Physical Review*, v. 100, ser. 2, Nov. 15, 1955, p. 1141-1144.

Total susceptibility is measured from room temperature down to 55° K. using the Gouy technique. Experimental difficulties encountered in attempt to measure susceptibility at liquid helium temperatures. Diagram, tables. 16 ref. (P16, Na)

94-P. The Specific Heats of Potassium, Rubidium and Caesium at Temperatures Below 330° K. T. M. Dauphinee, Douglas L. Martin and H. Preston-Thomas. *Royal Society, Proceedings*, v. 233, ser. A, Dec. 20, 1955, p. 214-222.

Anomalies were found in the specific heats of all these metals. The anomaly in rubidium is found to be affected by heat treatment of the sample. The caesium measurements give direct calorimetric information relating to the caesium-oxygen binary system. Graphs, tables. 14 ref. (P12, Na, K, Cs, Rb)

95-P. (English.) **Thermodynamic Properties of Alpha and Beta Silver-Magnesium Alloys.** Sukeji Kachi. *Science Reports of the Research Institutes, Tohoku University*, ser. A, v. 7, no. 4, Aug. 1955, p. 351-364.

Properties investigated, by electrochemical techniques, between 350 and 500° C. showed the degree of disorder alpha in the beta phase to be of the order of 10^{-4}, the enthalpies of mixing were negative and had marked maximum absolute value at the composition 1:1, and the existence of Ag_3Mg superlattice was confirmed from the e.m.f. and specific heat measurements. Graphs, tables, diagram. 19 ref. (P12, N10, Ag, Mg)

96-P. (English.) **On the Positions of the Equivalent Poles in a Magnetized Bar Tested by the Magnetometer Method. II. Tungsten Magnet Steel and K. S. Magnet Steel.** Hakaru Masumoto and Makoto Sugihara. *Science Reports of the Research Institutes, Tohoku University*, ser. A, v. 7, no. 4, Aug. 1955, p. 377-384.

Distribution of free magnestism in bars, in various states of magnetization, was measured by drawing out a search coil along the axis of the specimen. Tables, graphs. (P16, ST)

97-P. (French.) **Study of the Electrical Anisotropy of Gallium in the Vicinity of the Melting Point.** Israel Epelboin and Marc Erny. *Comptes rendus*, v. 241, no. 17, Oct. 24, 1955, p. 1118-1121.

Variation of the electrical resistivity of the monocrystals as a function of temperature. Graph. 5 ref. (P15, Ga)

98-P. (German.) **The Magnetic Behavior of Electrolytic Chromium.** R. Lingelbach. *Zeitschrift für physikalische Chemie (Frankfurt)*, v. 5, nos. 5-6, Nov. 1955, p. 273-283.

Susceptibility measurement of tempered and nontempered electrolytic chromium between 66 and 293° K. Graphs. 22 ref. (P16, Cr)

99-P. (Russian.) **Electrical Properties of Cadmium Telluride.** B. I. Boltaks, P. P. Konorov and O. A. Matveev.

Zhurnal tekhnicheskoi fiziki, v. 25, no. 13, Nov. 1955, p. 2329-2335.

Effect of temperature and impurities on electrical conductivity and coefficient of thermal e.m.f. Concentration and mobility of vacancies. Graphs, diagram, tables. 7 ref. (P15, Cd, Te)

100-P. The Heat of Combustion of Samarium. Elmer J. Huber, Jr., Clayton O. Matthews and Charles E. Holley, Jr. *American Chemical Society, Journal,* v. 77, Dec. 20, 1955, p. 6493-6494.

Results from colorimetric combustions of the metal, conducted at an initial temperature of 25° C. under an oxygen pressure of 25 atmospheres. Table. 12 ref. (P12, Sm)

101-P. Heats of Formation of Niobium Carbide and Zirconium Carbide From Combustion Calorimetry. Alla D. Mah and B. J. Boyle. *American Chemical Society, Journal,* v. 77, Dec. 20, 1955, p. 6512-6513.

Results of combustion calorimetric investigations. Table. 5 ref. (P12, Cb, Zr)

102-P. Alloyed-Junction Transistor Development. J. James Ebers. *Bell Laboratories Record,* v. 34, Jan. 1956, p. 8-12.

Production method for triode junction transistors of either the n-p-n or the p-n-p variety by an alloying process. Diagrams, micrograph, photographs, table. 1 ref. (P15, T1, Ge)

103-P. Radiation Effects in Solids. R. Smoluchowski, W. J. Leivo, H. Ingham, K. Kobayashi, P. V. Mitchell, E. A. Pearlstein and W. H. Vaughan. *Carnegie Institute of Technology (U. S. Atomic Energy Commission),* NYO-7379, Sept. 1955, 9 p.

Measurement of electrical conductivity, density, elastic constants, stored energy and optical absorption on irradiated and nonirradiated nonmetal crystals; energy dependence of radiation effects in metals and alloys; neutron irradiation effects in alpha brass. (P10, P general)

104-P. Mirror Coatings for Low Visible and High Infrared Reflectance. Georg Hass, H. H. Schroeder and A. F. Turner. *Optical Society of America, Journal,* v. 46, Jan. 1956, p. 31-35.

Effect of single and multilayer coatings on the reflectance of metals; description of two multilayer film designs suitable for producing mirror coatings with low visible and high infra-red reflectance. Diagrams, graphs. (P17)

105-P. Surface Resistance and Reactance of Metals at Infrared Frequencies. J. R. Beattie and G. K. T. Conn. *I.R.E., Proceedings,* v. 44, Jan. 1956, p. 78-81.

Behavior of a number of specimens of silver, aluminum, copper and nickel studied in the range 2.5 to 15 x 10^{13} cycles per sec. Graphs, table. 19 ref. (P15, Al, Ag, Cu, Ni)

106-P. On the Thermodynamics of Crystalline Lattices. L. Salter. *Royal Society, Proceedings,* v. 233 ser. A, Dec. 29, 1955, p. 418-427.

Approximate method of evaluating phase-space averages which takes on a simple form in the case of lattices with cubic symmetry. Graphs. 25 ref. (P12, M26)

107-P. Determination of the Vapor Pressure of Metals and Alloys. Rudolph Speiser and J. W. Spretnak. Paper from "Vacuum Metallurgy". Electrochemical Society, Inc., p. 155-191.

Apparatus and procedures used in a number of high and low-pressure methods. Deals with research done since 1950, principally in dynamical experimental procedures. Tables, graphs, diagrams. 65 ref. (P12)

108-P. (Dutch.) **Theoretical Iron Loss of Core-Type Transformers.** C. E. M. de Kuijper. *Smit mededelingen,* v. 10, no. 4, Oct.-Dec., 1955, p. 137-145.

Extensive mathematical development to include core corner losses. Graphs, diagrams. 7 ref. (P16, Fe)

109-P. (French.) **Electrochemical Behavior of Germanium. Voltage-pH Equilibrium Diagram of the Ge-H_2O System at 25° C.** N. de Zoubov, E. Deltombe and M. Pourbaix. *Centre Belge d'Etude de la Corrosion, Rapport Technique,* no. 27, 1955, 21 p.

Free enthalpies of formation at 25° C.; reactions and equilibrium formulas; interpretation of equilibrium diagrams. Diagrams, graph. 42 ref. (P15, P12, L17, Ge)

110-P. (French.) **Hall Effect, Spontaneous Magnetization, and Temperature.** Edgar A. Ascher. *Helvetica Physica Acta,* v. 28, no. 7, Dec. 1955, p. 667-693.

Perrier's theory is applied, assuming that each ferro-magnetic domain is anisotropic toward electrical and thermal conduction. Mathematical expression developed to explain the results. Tables, graphs, diagrams. 34 ref. (P15, P16, P12)

111-P. (German.) **Electrical Properties of the Intermetallic Compounds, Mg_2Si, Mg_2Ge, Mg_2Sn, and Mg_2Pb.** Ulrich Winkler. *Helvetica Physica Acta,* v. 28, no. 7, Dec. 1955, p. 633-666.

Investigation of polycrystalline preparations. Measurements of electric conductivity, Hall constants and

thermal force in temperature intervals from 100 to 1100° K. Tables, graphs, diagram. 33 ref. (P15, Mg, Ge, Pb, Si, Sn)

112-P. (Russian.) **Investigation of Magnetic Reversal Nuclei in Ferrosilicon Crystals.** Ia. S. Shur and V. R. Abel's. *Doklady akademii nauk SSSR,* v. 105, no. 3, Nov. 21, 1955, p. 469-471 + 1 plate.

Experimental investigation by means of change in the surface powder shapes. Micrographs. 5 ref. (P16, Fe, Si)

113-P. (Russian.) **Nature of Slow Sorption of Gases by Solid Substances.** M. I. Temkin and N. V. Kul'kova. *Doklady akademii nauk SSSR,* v. 105, no. 5, Dec. 11, 1955, p. 1021-1023.

Three types of sorption processes subdivided according to kinetic and temperature-range criteria. Mechanism of solubility of oxygen in liquid silver. 15 ref. (P13, Ag)

114-P. (Russian.) **Resistivity and Its Variation in a Strong Magnetic Field in the Case of Iron-Nickel Alloys in a Low-Temperature (14-90° K) Range.** E. Kondorskii and I. Ozhigov. *Doklady akademii nauk SSSR,* v. 105, no. 6, Dec. 21, 1955, p. 1200-1203.

Relation between resistivity and composition of alloys. Graphs. 3 ref. (P15, Fe, Ni)

115-P. Oxygen Content of Gray Cast Iron Increases With Time. R. C. Williams and H. W. Lownie, Jr. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 177-179; disc., p. 179-180.

Vacuum-fusion analyses showed that oxygen content of gray cast iron increases with time. Amount of oxygen absorbed and the absorption rate is determined by the structure of the graphite flakes on the surface of the iron. Micrographs, photograph, graph. 8 ref. (P13, P10, S11, Cl,)

116-P. The Electrical Resistance of Thorium Through the Allotropic Transition. Herbert W. Deem and Robert A. Winn. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* BMI-1052, Nov. 1955, 8 p.

The electrical resistance-temperature curve of thorium exhibits a reversible inflection at about 1400° C., corresponding with the allotropic transition in this vicinty. Resistance data indicate that such impurities as carbon, nitrogen and oxygen raise the transformation temperature. Diagram, graphs, table. 6 ref. (P15, N6, Th)

117-P. Pressure Dependence of the Resistivity, Hall Coefficient, and Energy Gap for InAs. Julius H. Taylor. *Physical Review,* v. 100, ser. 2, Dec. 15, 1955, p. 1593-1595.

Experimental results of hydrostatic pressure on the resistivity, Hall coefficient and energy gap for *n*-type polycrystalline indium arsenide. Graph, table. 3 ref. (P15, In, As)

118-P. Magnetic Properties of Erbium Metal. J. F. Elliott, S. Legvold and F. H. Spedding. *Physical Review,* v. 100, ser. 2, Dec. 15, 1955, p. 1595-1596.

Measurements of the magnetic moment of erbium metal in the temperature range from 20.4 to 90° K. The initial susceptibility shows a maximum at 78° K. and the metal appears to become ferromagnetic near 20° K. Graphs. 12 ref. (P16, Er)

119-P. Properties of Indium and Thallium at Low Temperatures. C. A. Swenson. *Physical Review,* v. 100, ser. 2, Dec. 15, 1955, p. 1607-1614.

Pressure-volume relationships for indium and thallium near absolute zero were observed; data were compared with theories which attempt to explain the variation of the superconducting transition temperature with pressure. Graphs, tables. 25 ref. (P15, In, Tl)

120-P. Fast-Neutron Bombardment of GaSb. J. W. Cleland and J. H. Crawford, Jr. *Physical Review,* v. 100, ser. 2, Dec. 15, 1955. p. 1614-1618.

Effect of reactor irradiation on the conductivity of shielded and unshielded samples. Graphs, table. 16 ref. (P15, P10, Ga, Sb)

121-P. Amphoteric Impurity Action in Germanium. W. Crawford Dunlap, Jr. *Physical Review,* v. 100, ser. 2, Dec. 15, 1955, p. 1629-1633.

The existence of a third state in gold is confirmed, and it is shown, with rather high degree of certainty, to be a donor level 0.05 ev. above the valence band. Diagram, graphs, table. 4 ref. (P15, Au, Ge)

122-P. Carrier Capture Probabilities in Nickel Doped Germanium. J. F. Battey and R. M. Baum. *Physical Review,* v. 100 ser. 2, Dec. 15, 1955, p. 1634-1637.

Explanation of similar phenomena occuring in nickel-doped and copper-doped germanium and interpretations of results of experiments. Graphs, tables. 7 ref. (P15, Ni, Ge)

123-P. Statistics and Galvanomagnetic Effects in Germanium and Silicon With Warped Energy Surfaces. Benjamin Lax and J. G. Mavroides. *Physical Review,* v. 100, ser. 2, Dec. 15, 1955, p. 1650-1657.

A method for carrying out calcu-

lations of the statistical properties and the galvanomagnetic effects of germanium and silicon which is valid for weak magnetic fields and takes anisotropy into account. Graphs, table. 29 ref.
(P15, P16, Ge, Si)

124-P. Hall Effect and Conductivity of InSb. H. J. Hrostowski, F. J. Morin, T. H. Gaballe and G. H. Wheatley. *Physical Review*, v. 100, ser. 2, Dec. 15, 1955, p. 1672-1676.

Semiconducting properties were determined at 1.3 to 700° K. from measurements of Hall coefficient and conductivity on single-crystal samples of low impurity content. Graphs, table. 19 ref. (P15, In, Sb)

125-P. Thermal Conductivity of Indium-Thallium Alloys in the Normal and Superconducting States. Norman E. Phillips. *Physical Review*, v. 100, ser. 2, Dec. 15, 1955, p 1719-1725.

Thermal conductivity measurements at temperatures below 1° K. Data are interpreted as meaning that thonon conductivity limited by boundary scattering is important in this region. Diagram, graphs. 18 ref. (P11, In, Tl)

126-P. An Adiabatic Specific Heat Calorimeter for the Range 15 to 290° C. W. E. Wallace, R. S. Craig and W. V. Johnston. *University of Pittsburgh (U. S. Atomic Energy Commission)*. NYO-6328, Oct. 1955 16 p.

Designed for intermittent heating so that the specific heat characteristic of the sample in an equilibrium state is obtained. Precision of the order of 0.1 to 0.2% is attained over the entire temperature range. Diagrams, table. 7 ref. (P12)

127-P. (English.) **The Specific Heat of Solids.** M. Blackman. Paper from "Handbook of Physics". v. VII. Pt. I. "Crystal Physics". Pt. I. Springer-Verlag, p. 325-382.

Lattice theory, calculation of velocity of crystal waves, vibrational spectra and lattic vibrations. Graphs, diagrams, tables. 29 ref. (P12)

128-P. (English.) **On the Theory of Superconductivity.** V. L. Ginzburg. *Nuovo cimento*, v. 2, ser. 10, no. 6, Dec. 1955, p. 1234-1250.

Macroscopic theory and superconductor behavior in weak high-frequency fields. Problems of formulating a microscopic theory considered. 30 ref. (P15)

129-P. (German.) **Results of Low-Temperature Investigations. XV. Determination of Electronic Heat in Metals. XVI. Atomic and Electronic Heat of Tantalum Between 10 and 273° K.** Klaus Clusius, Hans Heinrich Bühler and Celso Gutierrez Losa. *Zeitschrift für Naturforschung*, v. 10a, no. 12, Dec. 1955, p. 930-943.

Measurements of electrons and atomic heat capacities at very low temperatures. Determinations made on Ag, Cu, Al, Mg, Tl, Zr, V, U and Ta. Graphs, tables. 5 ref.
(P12, Ag, Cu, Al, Mg, Tl, Zr, V, U, Ta)

130-P. (German) **Magneto-Elastic Properties of Certain Ferromagnetic Iron-Nickel Alloys.** R. Ochsenfeld. *Zeitschrift für Physik*, v. 143, no. 4, 1955.

The delta-E effect depends not only on magnetizing conditions but on the magnetic reversal which is automatically produced during the experiment. Tables, graphs. 12 ref. (P16, Fe, Ni)

131-P. (Russian.) **Surface Resistivity of Tin in Superconductive State at a Frequency of $7.3X10_{10}$ Cycles.** P. A. Bezuglyi, A. A. Galkin and G. Ia. Levin. *Daklady akademii nauk SSSR*, v. 105, no. 4, Dec. 1, 1955. p 683-684.

Temperature relation and anomalies of curves for high-frequency resistance. Graphs. 5 ref. (P15, Sn)

132-P. (Russian.) **Crystal Chemistry of Oxide Compounds of Vanadium, Tungsten and Molybdenum.** R. P. Ozerov. *Uspekhi khimii*, v. 24, no. 8, 1955, p. 951-984.

Structures, crystal classifications and distances between atoms. Preparation and electroconductive, catalytic and magnetic properties of tungsten and vanadium bronzes.. Diagrams, tables, graphs. 123 ref. (P15, P16, M26, Mo, V, W)

133-P. (Book.) **Abstracts of the Literature on Semiconducting and Luminescent Materials and Their Applications.** 200 p. 1954. John Wiley & Sons, 440 Fourth Ave., New York 16, N. Y. $5.00.

A collection of over 750 informative abstracts emphasizing the properties and applications of the most common elements, in addition to the intermetallics, oxides, sulfides, halides, and organics; fluorescence and phosphorescence; and theory. (P15)

134-P. The Vapour Pressure of Solid Cadmium. T. A. O'Donnell. *Australian Journal of Chemistry*, v. 8, Nov. 1955, p. 485-492.

The Knudsen method is used to determine the vapor pressure within the range from 200 to 260° C. Design of effusion apparatus. Diagram, graph, tables. 16 ref. (P12, Cd)

135-P. Measurement of the Vapour Pressure of Bismuth by a Radioactive Tracer Technique. T. A. O'Donnell.

Australian Journal of Chemistry, v. 8, Nov. 1955, p. 493-500.

Measurement in temperature range from 400 to 500° C.; radioactive tracer technique is used to increase the sensitivity of the Knudsen method. Diagram, graph, table. 20 ref. (P12, S19, Bi)

136-P. Magnetic Susceptibility of Low Resistivity *n*-Type Germanium. F. T. Hedgcock. *Canadian Journal of Physics,* v. 34, Jan. 1956, p. 43-49.

Investigation of polycrystalline germanium between room and liquid nitrogen temperatures. Contribution to susceptibility from both free and bound charge carriers varied inversely with temperature. An effective mass for charge carriers found to be 0.16 of the free electron mass. Graphs. 18 ref. (P16, Ge)

137-P. The Thermodynamics of the Liquid Solutions in the Triad Cu-Ag-Au. I. The Cu-Ag System. Russell K. Edwards and James H. Downing. *Journal of Physical Chemistry,* v. 60, Jan. 1956, p. 108-111.

Partial pressures, determined as a function of temperature and composition, were used in study of thermodynamic properties and activities. Table, diagram, graph. 8 ref. (P12, M24, Cu, Ag)

138-P. The Magnetic Susceptibility of Rubidium. K. Venkateswarlu and S. Sriraman. *Journal of Scientific & Industrial Research,* v. 14, sec. B, Dec. 1955, p. 611-613.

Magnetic susceptibility at 30° C. was found using the Curie method, and its variation up to 100° C. observed for different field strengths. Tables, graph. 11 ref. (P16, Rb)

139-P. The Temperature-Resistance Characteristics of Uranium. L. L. Wyman and J. F. Bradley. *Knolls Atomic Power Laboratory (U. S. Atomic Energy Commission),* KAPL-851, Dec. 1952, 21 p.

Temperature-resistance relationships have been established for samples of alpha-rolled uranium; test data show a parallelism with previous dilatation studies on these materials and reflect the effects of the anisotropy of uranium; average physical constants are derived. Graphs, tables. 9 ref. (P general, U)

140-P. Some Factors in the Resistance of Crystals to Radiation Damage. C. W. Tucker, Jr., and P. Senio. *Knolls Atomic Power Laboratory (U. S. Atomic Energy Commission),* KAPL-1301, Mar. 1955, 8 p.

Following factors discussed in determining the radiation stability of a given material: homogeneity of damage; particle size; cleavage or fracture strength; grain boundaries; temperature; bond type. 4 ref. (P10, M26)

141-P. The Thermal and Electrical Conductivity of Silver-Palladium and Silver-Cadmium Alloys at Low Temperatures. W. R. G. Kemp, P. G. Klemens, A. K. Sreedhar and G. K. White. *Royal Society, Proceedings,* v. 233, ser. A, Jan. 10, 1956, p. 480-493.

Conductivities of many alloys were measured from 2 to 300° K., with consideration of lattice and electronic components and data on electrical resistance. Table, graphs. 29 ref. (P11, P15, Ag, Pd, Cd)

142-P. (German.) **Effect of the Precipitation Phenomena in the Temperature Range of Embrittlement at 475° C. Upon Some Magnetic Properties of Iron-Chromium Alloys.** Ewald Baerlecken and Heinz Fabritius. *Stahl und Eisen,* v. 75, no. 26, Dec. 29, 1955, p. 1774-1784.

Magnetic measurements on 24 to 66% chromium-iron alloys used for embrittlement studies at 475° C. Tables, graphs. (P16, Q23, N7, Fe, Cr)

143-P. (German.) **Effects of Radiations on Materials.** Wolfgang Riezler. *Stahl und Eisen,* v. 76, no. 1, Jan. 12, 1956, p. 14-17; disc., p. 17-18.

Mechanics of radiation by electrons, gamma-and X-rays, low and fast neutrons, and fast ions; summarizes most important devices for generation of these rays. Effect of radiation on properties of polyethylene, production of Frenkel defects and foreign atoms, and formation of spikes in metallic materials. 4 ref. (P10, P13)

144-P. (Russian.) **Magnetostriction Theory of Nickel Single Crystals.** N. S. Akulov. *Doklady akademii nauk SSSR,* v. 106, no. 1, Jan. 1, 1956, p. 31-34.

Quantitative explanation of the course of magnetostriction using the conjugated shifting method of calculation for regions of spontaneous magnetization. Graphs, diagram. 5 ref. (P16, Ni)

145-P. Thermal Conductivity and Linear Expansion of the Eutectic Uranium-Chromium Alloy. H. W. Deem, R. A. Winn and C. F. Lucks. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* BMI-900, Jan. 1954, 16 p.

As a potential material for use in power reactors, the alloy's thermal expansion is of interest for stress considerations in assembly and op-

eration, and its thermal conductivity is significant for heat transfer reasons. Measurements were made from 20 to 800° C. Tables, graphs. 1 ref. (P11, T25, U, Cr)

146-P. Specific Heat Of Liquid Metal and Salt Mixtures. T. B. Douglas. *Brookhaven National Laboratory, Division Of Engineering (U. S. Atomic Energy Commission)*, BNL-2446, Dec. 1955, p. 13-20.

Specific heat of several liquids measured and studied in relation to heat transfer. Results and method employed. Tables. (P12)

147-P. The Mass Transfer Properties of Various Metals and Alloys in Liquid Lead. J. V. Cathcart and W. D. Manly. *Corrosion,* v. 12, Feb. 1956, p. 87-91.

Relative resistance to mass transfer in liquid lead of 24 metals and alloys was measured. Tests were performed in small quartz thermal convection loops. The test temperature was about 800° C. with a thermal gradient of 300° C. existing across the loops. Micrographs, diagram, graph. 1 ref. (P10, Pb)

148-P. The Physics of Magnetic Materials. R. M. Bozorth. *Electrical Engineering,* v. 75, Feb. 1956, p. 134-140.

A review of findings in the field of solid state physics on the phenomena of magnetic materials. Describes application of these findings in practical engineering problems. Graphs, diagrams, tables. 15 ref. (P16)

149-P. Measurements of Contact Resistance Between Normal and Superconducting Metals. Fernand Bedard and Hans Meissner. *Physical Review,* v. 101, ser. 2, Jan. 1, 1956, p. 26-30.

The contact resistance between crossed wires of Pb and Sn, Pb and Cu, Sn and Cu, Sn and In, separated by their natural oxide layers, has been measured at constant temperatures as a function of current direction and magnitude. Diagrams, table, graphs. 9 ref.
(P15, Pb, Sn, Cu, In)

150-P. Paramagnetic Effect in Superconductors. II. Further Theoretical Aspects. Hans Meissner. *Physical Review,* v. 101, ser. 2, Jan. 1, 1956, p. 31-36.

Resistance and distribution of mean induction and current density at the point of maximum flux increase. Temperature dependence calculation for apparent relative permeability. Graphs, diagram. 9 ref. (P16, P15)

151-P. Thermal Magnetoresistance of Zinc at Low Temperatures. Perry B. Alers. *Physical Review,* v. 101, ser. 2, Jan. 1, 1956, p. 41-48.

Effect of low and high magnetic fields on the thermal magnetoresistance of crystals at various orientations and at two different temperatures. Diagrams, graphs, tables. 20 ref. (P16, Zn)

152-P. Interaction of Conduction Electrons and Nuclear Magnetic Moments in Metallic Sodium. T. Kjeldaas, Jr., and W. Kohn. *Physical Review,* v. 101, ser. 2, Jan. 1, 1956, p. 66-67.

The electronic wave function at the Fermi surface of metallic sodium is calculated and its connection with the Knight shift and the paramagnetic susceptibility discussed. 12 ref. (P15, P16, Na)

153-P. Optical Properties of Indium Antimonide in the Region from 20 to 200 Microns. Hiroshi Yoshinaga and Robert A. Oetjen. *Physical Review,* v. 101, ser. 2, Jan. 15, 1956, p. 526-531.

The reflectivity and transmission of crystals (*n*-type) measured between 20 and 200 μ. Graphs, tables. 13 ref. (P17, In, Sb)

154-P. Galvanomagnetic Effects in Bismuth. B. Abeles and S. Meiboom. *Physical Review,* v. 101, ser. 2, Jan. 15, 1956, p. 544-550.

Conductivity, Hall effect and magnetoresistance in single crystals of pure and tin-doped bismuth measured as functions of temperature between 80 and 300° K. and as functions of magnetic field up to 2000 oersted. Graphs, tables. 20 ref.
(P15, P16, Bi)

155-P. Infrared Absorption of Indium Antimonide. Eugene Blount, Joseph Callaway, Morrel Cohen, William Dumke and James Phillips. *Physical Review,* v. 101, ser. 2, Jan. 15, 1956, p. 563-564.

Infrared absorption near the adsorption edge interpreted as the superposition of two indirect transitions requiring phonons of 100° and 30°, the former transition involving the smaller electronic energy gap. Graphs. 15 ref.
(P17, In, Sb)

156-P. Infrared Absorption in *n*-Type Germanium. H. Y. Fan, W. Spitzer and R. J. Collins. *Physical Review,* v. 101, ser. 2, Jan. 15, 1956, p. 566-572.

Theory of absorption by free carriers is given, taking into account the effects of scattering by impurities and by lattice vibrations. Experimental results are reported for *n*-type germanium samples of various carrier and impurity concentrations. Graphs, table. 14 ref.
(P17, P15, Ge)

157-P. Hall Effect in Oriented Single Crystals of *n*-Type Germanium.

W. M. Bullis and W. E. Krag. *Physical Review*, v. 101, ser. 2, Jan. 15, 1956, p. 580-584.

Hall measurements have been made on oriented single crystals confirming the variations of the Hall coefficient with the direction and magnitude of the magnetic field, and with the direction of the current, which are predicted by theories based on the eight-ellipsoid model. Graphs. 15 ref. (P15, Ge)

158-P. Application of the Bethe-Weiss Method to Ferromagnetism. J. Samuel Smart. *Physical Review*, v. 101, ser. 2, Jan. 15, 1956, p. 585-591.

Bethe-Weiss theory of ferromagnetism is extended and applied to systems containing two nonequivalent sets of sites for the magnetic atoms. Tables, graphs. 14 ref. (P16, Fe)

159-P. Magnetic Properties of Nickel Telluride. Enji Uchida and Hisamoto Kondoh. *Physical Society of Japan, Journal*, v. 11, no. 1, Jan. 1956, p. 21-27.

Results of the magnetic characteristics of $NiTe_x$ where x, the molal content of tellurium, is varied over a wide range. Graphs. 12 ref. (P16, Ni)

160-P. Magnetic and Electrical Properties of Manganese Telluride. Enji Uchida, Hisamoto Kondoh and Nobuo Fukuoka. *Physical Society of Japan, Journal*, v. 11, no. 1, Jan. 1956, p. 27-32.

Reports on the dependence of susceptibility of the antiferromagnetic compound MnTe on temperature. Resistivity, the thermo-emf, and the Hall emf. given as functions of temperature. Graphs, diagram. (P15, P16, Mn)

161-P. The Properties of Some Reactively Sputtered Metal Oxide Films. L. Holland and G. Siddall. *Vacuum*, v. 3, Oct. 1953 (Published Dec. 1955), p. 375-391.

Metal oxides are used as electrically conductive and optically transparent coatings for glass. Related properties and the preparations of oxide of cadmium, tin, indium, iron, gold and bismuth are discussed. Tables, graphs, micrograph. 31 ref. (P15, L25, Fe, Au, Cd, Bi, Sn, In)

162-P. Collective Electron Model for Magnetization in Alloys. B. R. Coles and J. E. Goldman. Paper from "Conference on Magnetism and Magnetic Materials." American Institute of Electrical Engineers, p. 22-23.

The electron energy band model of ferromagnetism is applied to quantitatively explain the effect of alloying additions on the magnetic moment of iron. Graphs. 4 ref. (P16, Fe, SG-n)

163-P. The Saturation Magnetic Moments in Fe-Al Alloys. M. T. Pigott. Paper from "Conference on Magnetism and Magnetic Materials". American Institute of Electrical Engineers, p. 39-42.

Prediction of magnetic moments for random and ordered alloys by using a single set of localized moments having both positive and negative values. Diagrams, graphs. 8 ref. (P16, Fe, Al)

164-P. Metallurgy and Magnetic Materials. Joseph F. Libsch and George P. Conard. Paper from "Conference on Magnetism and Magnetic Materials". American Institute of Electrical Engineers, p. 80-88.

Effect of deformation, annealing, grain growth and alloying constituents on magnetic properties of materials prepared by wrought, cast or powder metallurgy techniques. Table, graphs. 37 ref. (P16, Al, Fe, Co)

165-P. The Effect of Plastic and Elastic Stresses on the Losses and the Domain Configurations of Grain Oriented 3% Si-Fe. P. W. Neurath. Paper from "Conference on Magnetism and Magnetic Materials". American Institute of Electrical Engineers, p. 92-99.

Experimental data shows relationships between stresses, 60-watt losses and domain patterns. Micrographs, diagrams, graphs, table. 6 ref. (P16, Fe)

166-P. Magnetostriction of Iron and Some Silicon Iron Alloys in High Fields. B. A. Calhoun and W. J. Carr, Jr. Paper from "Conference on Magnetism and Magnetic Materials". American Institute of Electrical Engineers, p. 107-111.

Measurements of forced linear magnetostriction of single crystals to determine if the strain is a true volume effect and if an anisotropy exists. Graphs, tables. 10 ref. (P16, Fe)

167-P. Some Notes on the Ferromagnetic Properties of Alloys With Superlattice. Hiroshi Sato. Paper from "Conference on Magnetism and Magnetic Materials". American Institute of Electrical Engineers, p. 119-125.

Use of a localized model for each atom in the alloy to interpret anomalies arising from the interplay of magnetic and atomic order. Graphs. 18 ref. (P16, N10)

168-P. Recent Advances in the Field of Permanent Magnets. K. J. Sixtus. Paper from "Conference on Magnetism and Magnetic Materials". American Institute of Electrical Engineers, p. 142-149.

Survey of properties of various classes of magnetic alloys. Graphs, micrographs, diagrams. 29 ref. (P16, SG-n)

169-P. An Approach to Elongated Fine Particle Magnets. I. S. Jacobs and C. P. Bean. Paper from "Conference on Magnetism and Magnetic Materials". American Institute of Electrical Engineers, p. 165-175.

Fine-particle magnets based upon crystal anisotropy are described. Table, graphs. 22 ref. (P16, Fe)

170-P. Permanent-Magnet Properties of Elongated Single-Domain Iron Particles. L. I. Mendelsohn, F. E. Luborsky and T. O. Paine. Paper from "Conference on Magnetism and Magnetic Materials". American Institute of Electrical Engineers, p. 176-183.

Reports permanent-magnet properties derived from the shape anisotropy of substantially elongated single-domain iron particles. Graphs, micrographs, tables. 32 ref. (P16, Fe)

171-P. Observation of the Magnetic Domains and Domain Wall in BiMn by the Kerr Magneto-Optic Effect. B. W. Roberts. Paper from "Conference on Magnetism and Magnetic Materials". American Institute of Electrical Engineers, p. 192-197.

The Kerr effect is operative for very fine particles; each particle is light or dark depending upon orientation and polarity; surface preparation includes a fine mechanical polish, using ethyl alcohol as a lubricant to avoid decomposition with water. Micrographs. 10 ref. (P16, Bi, Mn)

172-P. The Anomalous Behavior of Alnico-V in the Sub-Curie Temperature Region of 1000° F. Through 1450° F. J. R. Hansen. Paper from "Conference on Magnetism and Magnetic Materials". American Institute of Electrical Engineers, p. 198-204.

Data regarding the anomalous behavior of Alnico-V that is not readily explained on the basis of compound precipitation. Graphs, micrographs, tables. 8 ref. (P16, SG-n)

173-P. New Facts Concerning the Permanent Magnet Alloy, Alnico 5. E. A. Nesbitt and H. J. Williams. Paper from "Conference on Magnetism and Magnetic Materials". American Institute of Electrical Engineers, p. 205-209.

Experimental report on the detection of fine precipitated particles by measuring the magnetic torque of various field strengths, and separate effects of shape and crystal anisotropy on coercive force. Graphs, micrographs. 5 ref. (P16, SG-n)

174-P. Relation of D-C Magnetic Properties of Oriented 48% Nickel-Iron to Magnetic Amplifier Performance. C. E. Ward and M. F. Littmann. Paper from "Conference on Magnetism and Magnetic Materials". American Institute of Electrical Engineers, p. 228-235.

Direct current magnetic tests used to investigate material properties of a planned group of cores; the results were studied using standardized cores and carefully calibrated test circuitry. Diagrams, graphs, table. 8 ref. (P16, Fe, Ni)

175-P. Soft Magnetic Materials With Rectangular Hysteresis Loops. N. I. Ananthanaravanan. Paper from "Conference on Magnetism and Magnetic Materials". American Institute of Electrical Engineers, p. 236-246.

Structural conditions necessary to obtain rectangular hysteresis loops and the practical methods of obtaining these structural conditions in polycrystalline materials, with special reference to some of the most widely used materials. Diagram, graphs. micrographs, table. 86 ref. (P16, SG-p)

176-P. Anomalous Rotational Damping in Ferromagnetic Sheets. T. L. Gilbert and J. M. Kelly. Paper from "Conference on Magnetism and Magnetic Materials". American Institute of Electrical Engineers, p. 253-263.

A previously unexplored method is presented for determining the anomalous damping by measuring the torque on a thin ferromagnetic disk in a strong rotating field. Diagrams, graphs, tables. 6 ref. (P16, SG-n)

177-P. Dynamax, a New Crystal and Domain Oriented Magnetic Core Material. G. H. Howe. Paper from "Conference on Magnetism and Magnetic Materials". American Institute of Electrical Engineers, p. 264-272.

Investigation of 65 permalloy (65% nickel-iron) indicates that heat treatment in a magnetic field is more effective on strip of low polycrystalline alignment. Diagrams, graphs, photographs, micrographs, tables. 2 ref. (P16, Ni)

178-P. Magnetic Effects of Compressional Stress at Low Field Inten-

sities. R. E. Fischell. Paper from "Conference on Magnetism and Magnetic Materials". American Institute of Electrical Engineers, p. 315-320.

Toroidal, laminated cores of several important magnetic materials were tested for the low field intensity magnetic properties at compressional stresses ranging from 0 to 500 psi. Diagrams, graphs, photographs, tables. 1 ref. (P16, Q28, SG-n)

179-P. Effect of Temperature on the Permeability and Core Loss of Electrical Steels. J. J. Clark. Paper from "Conference on Magnetism and Magnetic Materials". American Institute of Electrical Engineers, p. 329-333.

Test results obtained on a number of materials over a range of temperatures from −75 to +96° C.; materials tested included magnetic ingot iron, cold rolled low-carbon steel, Hipernik alloy, and a number of silicon steels of low, medium and high silicon content. Graphs, tables. 2 ref. (P16, SG-n)

180-P. Stability Characteristics of Molybdenum Permalloy Powder Cores. C. D. Owens. Paper from "Conference on Magnetism and Magnetic Materials". American Institute of Electrical Engineers, p. 334-339.

Inherent stability characteristics of molybdenum permalloy powder cores and the apparatus design factors which affect the stability considered on basis of experience from telephone applications. Diagrams, graphs, photograph, micrograph. (P16, H general, SG-n, Mo, Ni, Fe)

181-P. Low Temperature Electrical Resistance of Fifteen Commercial Conductors. O. E. Park, M. M. Fulk and M. M. Reynolds. Paper from "Proceedings of the 1954 Cryogenic Engineering Conference". NBS Report 3517, p. 101-102.

Preparation of samples and procedure, results of measurements. Table. 2 ref. (P15)

182-P. Thermal Radiation Absorption by Metals. M. M. Fulk, M. M. Reynolds and O. E. Park. Paper from "Proceedings of the 1954 Cryogenic Engineering Conference". NBS Report 3517, p. 151-157.

Ability of a metal surface to radiate or absorb radiant energy is governed by material and its physical condition. Various metals and surface treatments discussed. Tables, graphs. 1 ref. (P11, P17)

183-P. Thermal Conductivity of Solids at Low Temperatures. R. L. Powell and D. O. Coffin. Paper from "Proceedings of the 1954 Cryogenic Engineering Conference". NBS Report 3517, p. 189-193.

Measurement of thermal conductivity of pure metals, alloys and disordered dielectrics. Results given for a silver solder and a free-cutting copper. Diagrams, graphs, photograph. 1 ref. (P11, Cu, Ag)

184-P. Accurate Measurement of Certain Physical Properties Down to 20° K. Herrick L. Johnston, Robert W. Powers, Howard W. Altman, Thor Rubin and Robert W. Mattox. Paper from "Proceedings of the 1954 Cryogenic Engineering Conference". NBS Report 3517, p. 194-195.

Apparatus designed and measurements carried out for thermal conductivity, thermal expansion and compressibility of solids and condensed gases. Graphs, diagrams. (P11, P10, SS, U, Fe)

185-P. A New Criterion for Superconductivity in Metals. Gerhart Groetzinger, David Kahn and Philip Schwed. Paper from "Proceedings of the 1954 Cryogenic Engineering Conference". NBS Report 3517, p. 196-199.

Criteria proposed by Kikoin and Lasarew, Fröhlich and Bardeen; presents new criterion. Table. 4 ref. (P15)

186-P. (French.) **Research on the Thermo-Electric Properties of Aluminum in Very Thin Sheets.** Jean Savornin. *Métaux, corrosion-industries,* v. 30, no. 363, Nov. 1955, p. 446-449.

The thermo-electric properties of thin sheets of aluminum obtained by evaporation of the metal in vacuum studied in relation to copper and silver. Table, graph. 6 ref. (P15, Cu, Al, Ag)

187-P. (Russian.) **Effect of Radiation on the Physical Properties and Structure of a Solid.** A. I. Zakharov. *Uspekhi fizicheskikh nauk,* v. 57, no. 4, 1955, p. 525-576.

Changes in properties of ordered alloys in resistivity, temperature coefficient, magnetic saturation. Crystal-lattice changes; phase transformations; diffusion in alloys; elastic properties. Effect of radiation on semiconductors. Graphs, tables, diagram. 91 ref. (P general, N general, Ni)

188-P. (Russian.) **Theory of Magnetic Susceptibility of Metals at Low Temperatures.** I. M. Lifshits and A. M. Kosevich. *Zhurnal eksperimental'noi i teoreticheskoi fiziki,* v. 29, no. 6, 1955, p. 730-742.

Magnetic properties of electrons in metal for given law of dispersion. Energy levels of a quasi-par-

ticle with given law of dispersion in a magnetic field; magnetic moment of the gas of such quasi-particles. Periods and amplitudes of oscillation determined by form of Fermi's boundary surface. 8 ref. (P16)

189-P. (Russian.) **DeHaas-Van Alfen Effect in Thin Layers of Metals.** A. M. Kosevich and I. M. Lifshits. *Zhurnal eksperimental'noi i teoreticheskoi fiziki,* v. 29, no. 6, 1955, p. 743-747.

Energy levels of quasi-particle with given law of dispersion in a magnetic field. Oscillating part of magnetic moment of gas of such quasi-particles. Fermi's boundary surface. Diagrams. 2 ref. (P16)

190-P. Electron Ejection From Metals by Ions. H. D. Hagstrum. *Bell Laboratories Record,* v. 34, Feb. 1956, p. 63-67.

The operation of a gas-filled electron tube depends upon the release of electrons from the cold cathode by the action of gaseous ions, providing another means of probing the surface properties of metals and energy levels of electrons in them. Diagrams, graphs, photographs. (P15)

191-P. Electrical Steels. P. H. Estes. *Canadian Mining and Metallurgical Bulletin,* v. 49, no. 526, Feb. 1956, p. 82-86.

Three major trends away from hot rolled sheet materials are given —cold reduced silicon strip, oriented silicon strip and common iron. Graphs. (P15, P16, ST)

192-P. Review of Germanium Surface Phenomena. R. H. Kingston. *Journal of Applied Physics,* v. 27, Feb. 1956, p. 101-114.

Surface behavior as related to diode and transistor technology. The electronic behavior of the bulk semiconductor as influenced by the surface is fairly well understood; major unsolved problems lie in the realm of chemistry and atomic structure. Graphs, table, diagrams. 99 ref. (P13, P15, Ge)

193-P. Effect of Stress on the Expansion Coefficient. A. R. Rosenfield and B. L. Averbach. *Journal of Applied Physics,* v. 27, Feb. 1956, p. 154-156.

The expansion coefficients of specimens under tensile stress and after the stress has been removed have been measured for three steels (0.20,0.40 and 0.80% carbon) and for two types of Invar. Tables, graphs. 6 ref. (P11, Q27, Fe, ST)

194-P. Effect of Quenching on the Resistivity of Au-Cd. M. S. Wechsler and T. A. Read. *Journal of Applied Physics,* v. 27, Feb. 1956, p. 194-195.

Some preliminary experiments on the effect of quenching on the resistivity of gold-cadmium single crystals of nominal compositions 47.5 and 49 atomic-percent cadmium. Graphs. 4 ref. (P15, Au, Cd)

195-P. Thermodynamic Properties of Solid Fe-Au Alloys. L. L. Seigle. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Feb. 1956, p. 91-97.

Free energies, heats and entropies of mixing, measured by the galvanic cell method between 800 and 900° C., show a positive deviation from Raoult's law and a large excess entropy of mixing. Graphs. 20 ref. (P12, Fe, Au)

196-P. Effects of Alloying Elements on the Electrical Properties of Manganin-Type Alloys. D. D. Pollock and D. I. Finch. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Feb. 1956, p. 203-210.

Study of relationships between the compositions of specially prepared copper-manganese-nickel-iron alloys and their electrical properties at room temperature. Graphs, tables. 16 ref.
(P15, T1, Ca, Mn, Ni, Fe)

197-P. On the Impurity Conduction in Germanium. Yasuo Kanai and Riro Nü. *Physical Society of Japan, Journal,* v. 11, no. 1, Jan. 1956, p. 83-84.

Germanium samples, in which nickel was added as an impurity, have been prepared, and their electrical properties measured from room temperature to liquid air temperature. Graph. 5 ref. (P15, Ge)

198-P. (Italian.) **The Influence of Free Carbon on the Magnetic Properties of Iron and Silicon Iron.** Andrea Ferro and Giorgio Montalenti. *Ricerca scientifica,* v. 25, no. 10, Oct. 1955, p. 2828-2833.

Variations in the magnetic properties of iron and silicon iron caused by a precipitation treatment of carbon always present as a free element in very small amounts in these materials. Graphs. 5 ref. (P16, Fe)

199-P. (Book.) **Conference on Magnetism and Magnetic Materials.** 370 p. 1955. American Institute of Electrical Engineers, 33 W. 39th St., New York 18, N. Y. $8.00.

Reports on theory, resonance phenomena, metallurgical and structural factors, apparatus, and com-

ponents. Pertinent papers are separately abstracted. (P16, SG-n, p)

200-P. Attenuation of 5 Mc. Sound in Aluminum at Low Temperatures. T. S. Hutchison and A. J. Filmer. *Canadian Journal of Physics,* v. 34, Feb. 1956, p. 159-165.

Attenuation of 5 Mc. sound waves in polycrystalline aluminum has been found to reach a maximum at 155° K.; activation energy for the process agrees with that deduced by Mason from a theory of dislocation relaxation. Diagram, graphs. 8 ref. (P10, Al)

201-P. Mechanism of Hydrogen Evolution at Tellurium Cathodes in Hydrochloric Acid. I. A. Ammar and S. A. Awad. *Electrochemical Society, Journal,* v. 103, Mar. 1956, p. 182-186.

Hydrogen overpotential at tellurium cathodes was studied in the concentration range 0.005*N* to 5*N* aqueous hydrochloric acid at 30° C. In concentrated solutions, a rate-determining dual electrochemical catalytic mechanism, with a slope of 0.06 v. at 30° C., was suggested to explain the results in the low current density range. Diagram, graphs, tables. 15 ref. (P15, Te)

202-P. Electrochemical Techniques in the Thermodynamics of Metallic Systems. R. A. Oriani. *Electrochemical Society, Journal,* v. 103, Mar. 1956, p. 194-201.

Details for successful operation of galvanic cells employing nonaqueous electrolytes described for both liquid and solid alloys. Applications to the determination of phase diagrams are outlined. Possibilities of obtaining surface free energies discussed. A comprehensive bibliography of galvanic cell studies of metallic systems is presented. Diagrams, graphs, tables. 95 ref. (P12, M24)

203-P. Specific Heat and Heat of Transformation of $MgCd_3$. B. M. Rosenbaum and B. Welber. *Journal of Chemical Physics,* v. 24, Feb. 1956, p. 485-486.

Specific heats were measured to investigate first and second-order transformations. Table, graph. 11 ref. (P12, N11, Mg, Cd)

204-P. Superconductivity. A. Wexler. *Metal Progress,* v. 69, Mar. 1956, p. 89-93.

At extremely low temperatures, electrical resistance decreases to an immeasurably small value and the material becomes perfectly diamagnetic. Unfortunately, the highest temperature at which superconductivity is found is 18° K., or about −430° F. Graphs, table. (P15)

205-P. Electrical Resistivity Tensor for Aluminum Single Crystals Deformed at Helium Temperature. A. Sosin and J. S. Koehler. *Physical Review,* v. 101, ser. 2, Feb. 1, 1956, p. 972-977.

Attempts to secure a simple type of deformation by making tensile tests at helium temperature and to analyze types and amounts of defect present by measuring all components of the resistivity tensor. Tables, diagrams, graphs. 6 ref. (P15, Q24, Al, He)

206-P. The Kelvin Relations in Thermo-Electricity. E. H. Sondheimer. *Royal Society, Proceedings,* v. 234, ser. A, Feb. 21, 1956, p. 391-398.

General proof of the Kelvin relations among the thermo-electric effects in conducting crystals, the departure from equilibrium of both the electron and the lattice distribution functions being taken into account. 7 ref. (P15)

207-P. Low Temperature Research. A. Wexler. *Westinghouse Engineer,* v. 16, Mar. 1956, p. 34-38.

Reasons for studying metals at low temperatures; superconductor properties; brief summaries of some low-temperature research projects now underway. Diagrams, graphs, photograph. (P15)

208-P. Thermal Conductivity of Powder-Metallurgy Uranium. H. W. Deem and H. R. Nelson. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* BMI-745, May 1952, 15 p.

Thermal-conductivity measurements made on three powder compacts of uranium and, for comparison, on one sample of cast and wrought metal. Diagram, graph, table. 4 ref. (P11, U)

209-P. The Behavior of Ferromagnetics Under Strong Compression. F. D. Stacey. *Canadian Journal of Physics,* v. 34, Mar. 1956, p. 304-311.

Specimens in form of thin disks subjected to strong compression simultaneously with high magnetic fields by means of a newly designed permeameter. Magnetization curves extending to saturation plotted for a number of materials at pressures up to 10,000 atmospheres, the most interesting results being the strong increase in saturation shown by nickel and nickel alloys. Diagram, graphs. 16 ref. (P16, Ni, Cu, Fe, Co, SS)

210-P. Stability Characteristics of Molybdenum Permalloy Powder Cores.

C. D. Owens. *Electrical Engineering,* v. 75, Mar. 1956, p. 252-256.

Intrinsic properties and basic behavior, as well as design considerations. Graphs, diagrams, micrograph, photograph. 2 ref. (P16, T1, Mo)

211-P. Ferromagnetism in Relation to Engineering Magnetic Materials. F. Brailsford. *Institution of Electrical Engineers, Proceedings,* v. 103, pt. A, no. 7, Feb. 1956, p. 39-51.

Review of recent theoretical and experimental work, ferromagnetic domains and the small-particle theory of high coercivity, ferrites and ferrimagnetism, magnetic phenomena occurring at high frequencies. Diagrams, graphs, table. 34 ref. (P16, Fe)

212-P. The Mass-Transfer Properties of Various Metals and Alloys in Liquid Lead. J. V. Cathcart and W. D. Manly. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission),* ORNL-2008, Feb. 1956, 9 p.

Tests were performed on 21 metals and alloys in small, quartz thermal-convection loops at about 800° C., with a thermal gradient of 300° C. existing across the loops. Only niobium and molybdenum showed high resistance to mass transfer, while nickel and nickel-rich alloys were highly susceptible. Graphs, diagrams, micrographs. 1 ref. (P12, Pb)

213-P. Statistics of the Three-Dimensional Ferromagnet. IV. The Face Centered and Body Centered Cubic Lattices. E. Dempsey and D. Ter Haar. *Physica,* v. 22, no. 1, Jan. 1956, p. 1-3.

Kramers' variational method used to derive the partition functions per spin for the cubic ferromagnetic structures, and these are compared with partition function derived by approximate methods. Tables. 25 ref. (P16)

214-P. On the Transport Properties of Metals and Semi-Conductors. D. Ter Haar. *Physica,* v. 22, no. 1, Jan. 1956, p. 61-68.

How simple kinetic arguments can be used to derive approximate expressions for the thermal conductivity, thermoelectric power, Hall constant and magnetoresistance of metals and semiconductors, including in some cases the contribution from lattice current. 14 ref. (P11, P15, P16)

215-P. Effects of Pressure on the Electrical Properties of Semiconductors. Donald Long. *Physical Review,* v. 101, ser. 2, Feb. 15, 1956, p. 1256-1263.

Measurements made of effects of hydrostatic pressures from 1 to 2000 atmospheres on the electrical properties of germanium, indium antimonide, indium arsenide, gallium antimonide, tellurium and magnesium stannide. Graphs, tables. 13 ref. (P15)

216-P. Infrared Absorption and Oxygen Content in Silicon and Germanium. W. Kaiser, P. H. Keck and C. F. Lane. *Physical Review,* v. 101, ser. 2, Feb. 15, 1956, p. 1264-1268.

Pulled silicon crystals showed an absorption at 9μ which is caused by oxygen originating from the quartz crucible. Model suggested in which oxygen atoms occupy interstitial positions and form bonds with two neighboring silicon atoms in the silicon lattice. Oxygen-free silicon has a weak lattice absorption at 9μ. Corresponding absorption at 11.6μ in germanium was found to be superimposed above a weak lattice band. Graphs, tables. 14 ref. (P17, M25)

217-P. Modulation of Conductivity by Surface Charges in Metals. G. Bonfiglioli, R. Malvano and E. Coen. *Physical Review,* v. 101, ser. 2, Feb. 15, 1956, p. 1281-1284.

Experimental technique and results obtained for gold, bismuth and antimony. Tentative interpretation of the peculiar features found. Graphs, diagrams. 10 ref. (P15, Au, Bi, Sb)

218-P. Effect of Dislocations on the Minority Carrier Lifetime in Semiconductors. A. D. Kurtz, S. A. Kulin and B. L. Averbach. *Physical Review,* v. 101, ser. 2, Feb 15, 1956, p. 1285-1291.

Density of random dislocations in germanium and silicon crystals measured by means of X-ray rocking curves and by etch pit counting. Data obtained by the two methods were in good agreement, and dislocation densities in the range 10^4 to 10^7 per sq.cm. were found. Graphs, micrographs, table. 14 ref. (P15, M26, Si, Ge)

219-P. Thermal Expansion Coefficients for 51 Metals. W. A. Tucker. *Product Engineering,* v. 27, Mar. 1956, p. 215, 217.

Reference sheets tabulating composition and condition prior to test. Tables. (P11)

220-P. (English.) **Paramagnetic Susceptibility Measurements on PdAg Al-**

loys. Ebbe Kronqvist. *Arkiv för Fysik,* v. 10, no. 1, 1956, p. 49-57.

Measurements on palladium and three palladium-silver alloys from room temperature to 1000° K. Tables, graphs, diagram. 18 ref. (P16, Pd, Ag)

221-P. (English.) **Studies on the Wetting Effect and the Surface Tension of Solids. The Change in Scratch Hardness of Metals Due to Wetting by Liquids. The Softening Effect of Wetting Water on Knife-Scouring With Whetstone.** Mizuho Sato. *Japan Academy, Proceedings,* v. 31, no. 9, Nov. 1955, p. 620-624.

Experiment shows scratch hardness is decreased by wetting with methanol, glycerin and distilled water. Graphs, micrographs. 1 ref. (P10, Q29, ST, Al, Mg)

222-P. (French.) **Electrochemical Behavior of Vanadium. Voltage-pH Equilibrium Diagram of the System V-H_2O at 25° C.** E. Deltombe, N. de Zoubov and M. Pourbaix. *Centre Belge d'Etude de la Corrosion, Rapport Technique,* no 29, 27 p. 1956.

Conclusions are drawn relative to the general properties of vanadium and its oxides. Phase diagrams. 38 ref. (P15, V)

223-P. (French.) **Improvement by Boron Treatment of the Electrical Conductivity of Aluminum Containing Titanium or Vanadium.** A. Domony and K. R. Vassel. *Metaux, Corrosion-Industries,* v. 31, no. 365, Jan. 1956, p. 18-21.

Determination of the optimum conditions for boron treatment; formulation of a theory for refining by boron. Tables, graphs. (P15, Ti, V, B)

224-P. (German.) **Magnetic Behavior of Intermetallic Phases of the Sodium-Thallium Type.** W. Klemm and H. Fricke. *Zeitschrift für anorganische und allgemeine Chemie,* v. 282, nos. 1-6, Dec. 1955, p. 162-168.

Investigation of magnetic behavior of NaIn, NaTl, LiAl, LiIn, LiZn and LiCd, of which some are low dia and some low para-magnetic. Tables, diagram. 8 ref. (P16, Na, Tl)

225-P. (German.) **Ferro and Anti-Ferro Magnetic Properties of the System Gold-Manganese.** Albrecht Kussmann and Ernst Raub. *Zeitschrift für Metallkunde,* v. 47, no. 1, Jan. 1956, p. 9-15.

Between 15 and 23 at. % manganese ferromagnetism, curie temperatures from + 100 to − 100° C., and maximum saturation values of 5000 Gauss were found. The phase Au_2Mn possesses anomalous magnetic properties showing a magnetization curve rising with increasing field intensity, first slowly followed by a rapid rise at high intensities up to 1700 Gauss. Table, graphs, micrographs, phase diagram. 13 ref. (P16, M24, Au, Mn)

226-P. (German.) **Determination of Surface Tension of Rubidium From the Phenomena of Surface Diffusion.** Horst Wegener. *Zeitschrift für Physik,* v. 143, no. 5, 1956, p. 548-558.

A drop-condensate (rubidium and quartz) consists of large and small liquid drops one beside the other. In the course of time, the smaller drops coalesce into larger ones. The movement of the substances is due to the diffusion of rubidium atoms along the quartz surface. These processes can be pursued quantitatively by means of electrolytic model tests. Graphs, table, micrographs. 6 ref. (P10, Rb)

227-P. (Russian.) **Temperature Relation of the Galvanomagnetic Effect in Iron-Nickel Alloys.** D. I. Volkov and R. S. Taichinov. *Moskovskogo universiteta, vestnik, seriia fiziko-matematicheskikh i estestvennykh nauk,* v. 10, no. 12, Dec. 1955, p. 75-79.

Relation between temperature and saturation magnetostriction. Graphs. 5 ref. (P16, Fe, Ni)

228-P. (Russian.) **Adsorption of Hydrogen on Platinum-Gold Alloys.** K. A. Lapteva, T. I. Borisova and M. G. Slin'ko. *Zhurnal Fizicheskoi Khimii,* v. 30, no. 1, Jan. 1956, p. 61-68.

Hydrogen adsorption changes little on adding gold to the platinum, up to 10%, and then falls off sharply, reaching zero for the 60% gold alloy. Tables, graphs. 13 ref. (P13, Au, Pt)

229-P. (English.) **Isothermal Measurements on the Release of Energy Stored in Cold-Worked Aluminium.** H. U. Åström. *Arkiv för Fysik,* v. 10, no. 3, 1956, p. 197-211.

A study of the release of energy from room-temperature compressed high-purity aluminum bolts, in the range from 70 to 350° C., by isothermal calorimetric measurements. Tables, graphs, micrographs. 26 ref. (P12, Al)

230-P. (English.) **New Determination of the Temperature of Gold and Silver Points on the Thermodynamic Temperature Scale.** Jiro Oishi, Mitsuru Awano and Takeshi Mochizuki. *Physical Society of Japan, Journal,* v. 11, no. 3, Mar. 1956, p. 311-321.

The freezing points of gold and silver determined by a constant vol-

ume nitrogen gas thermometer with a gas bulb made of silica glass. Diagrams, tables, graphs. 9 ref. (P12, Au, Ag)

231-P. (French.) **Law of Approximation for the Saturation of a Fe-Si Monocrystal in the Three Principal Crystallographic Directions.** M. Henri Danan. *Comptes rendus,* v. 242, no. 6, Feb. 6, 1956, p. 748-750.

For values of the lower field up to 27,000 oersteds, there is no saturation; the greatest magnetic hardness corresponds to the direction where the anisotropic energy is maximum. Diagram, graphs. 4 ref. (P16, Fe)

232-P. (French.) **Electronic Apparatus for Measuring Magnetic Susceptibilities.** Jacques Joussot-Dubien, Bernard Lemanceau and Adolphe Pacault. *Journal de Chimie Physique,* v. 54, no. 2, Feb. 1956, p. 198-205.

Easy-to-use apparatus giving results similar to those given by classic apparatus with a large constant magnetic field. Diagrams, graph, tables. 16 ref. (P16)

233-P. (Russian.) **Determination of Vapor Pressure of Solid Cobalt and Iron by Means of Radioactive Isotopes.** Iu. V. Kornev and V. N. Golubkin. *Fizika metallov i metallovendenie,* v. 1, no. 2, 1955, p. 286-297.

Measurement methods include absorption of inert gas, rate of sublimation and rate of vapor flow from a small opening. Temperature relation of vapor pressure. Diagram, tables, graphs. 19 ref. (P12, Co, Fe)

234-P. (Russian.) **Electrical Properties of InSb.** D. N. Nasledov and A. Iu. Khalilov. *Zhurnal Teknicheskoi Fiziki,* v. 26, no. 1, Jan. 1956, p. 6-14.

Hole and electron conductivity. Temperature relation of electrical conductivity from 1.3 to 673° C. Hall effect up to 30,000 oersteds, and change of resistance in magnetic fields. Graphs. 10 ref. (P15, In, Sb)

235-P. The Solubility of Uranium in Fused Hydroxides. J. W. Droege, M. J. Snyder and R. B. Filbert, Jr. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* BMI-928, July 1954, 27 p.

Solubilities in molten hydroxides of sodium and lithium measured by filtering mixtures containing an excess of uranium. The molten mixtures were held in a nickel container and filtered through graphite filters, using controlled atmospheres of argon and hydrogen. Diagrams, graphs, tables. (P13, N12, U)

236-P. Electrolytic Shaping of Germanium and Silicon. A. Uhlir, Jr. *Bell System Technical Journal,* v. 35, Mar. 1956, p. 333-347.

Properties of electrolyte-semiconductor barriers with emphasis on germanium; use of these barriers in localizing electrolytic etching. Other localization techniques, electrolytes for etching germanium and silicon. Diagrams, graphs, photographs. 16 ref. (P15, L12, Ge, Si)

237-P. Diffusion Effects in Drift Mobility Measurements in Semiconductors. J. P. McKelvey. *Journal of Applied Physics,* v. 27, Apr. 1956, p. 341-343.

Drift mobility measurements in semiconductors using small steady d.c. fields. Measurements of transit times vs. sweep field show that the diffusion corrections are in agreement with experiment. Diagrams, graphs. 9 ref. (P15, N1)

238-P. Review of the Effects of Hydrogen in Steel. E. R. Slaughter. *Journal of Metals,* v. 8, Apr. 1956, p. 430-431.

Hydrogen retained in steel may result in important defects, particularly in heavy sections of killed carbon and alloyed steels. Graphs. 3 ref. (P10, ST)

239-P. The Use of Cyclotron Irradiation in the Study of Radiation Effects on Materials; Techniques Developed Since 1952. William S. Gilbert and Alan Andrew. *North American Aviation, Inc. (U. S. Atomic Energy Commission),* NAA-SR-1477, Mar. 1956, 16 p.

Details of methods covering both metals and graphite over a temperature range of irradiation from −196 to +500° C.; details of an instantaneous cyclotron. Diagrams, photograph. (P10)

240-P. Hall Effect and Magnetic Properties of Armco Iron. Simon Foner. *Physical Review,* v. 101, ser. 2, Mar. 15, 1956, p. 1648-1652.

The effect is given by a sum of the ordinary and the extraordinary effect over the range investigated, including the nonlinear region. Shows that the extraordinary Hall constant is independent of field within the experimental error. Graphs, tables. 20 ref. (P15, P16, Fe)

241-P. Photoemission From Silver Into Sodium Chloride, Thallium Chloride, and Thallium Bromide. W. J. Turner. *Physical Review.* v. 101, ser. 2, Mar. 15, 1956, p. 1653-1660.

Photoelectric work function for the transfer of electrons from a clean metal surface directly into an insulating crystal lattice. Diagrams, graphs. 20 ref. (P15, Ag)

242-P. (German.) **Semi-Conductivity Properties of $ZnAs_2$.** C. Fritzsche. *Annalen der Physik,* v. 17, no. 2-3, 1956, p. 94-101.

By smelting the components in a pressure bomb, compact, crystallized zinc arsenide can be obtained. It is a semiconductor with relatively high conductivity, suitable for contact rectifiers. Table, graphs, diagrams, diffractogram, photograph. 8 ref. (P15, As, Zn)

243-P. (German.) **Hall Effect of Pure Iron and a Steel with 1.2% C.** Werner Jellinghaus und Miguel Pedrode Andrés. *Archiv für das Eisenhüttenwesen,* v. 27, no. 3, Mar. 1956, p. 187-192.

Fundamentals of Hall effect in ferromagnetic materials. Auxiliary phenomena during measurements and comparison with data from literature. Effect of tempering. Tables, graphs, diagrams. 18 ref. (P15, Fe, Cn)

244-P. Thermal Conductivity of Zirconium and Zirconium-Tin Alloys. H. W. Deem. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* BMI-849, July 1953, 9 p.

Thermal conductivities of zirconium-tin alloys and a zirconium-uranium-tin-iron-chromium-nickel alloy measured over the temperature range 50 to 400° C. Thermal conductivity values at 300° C. ranged from 0.19 watt per cm. per °C. for unalloyed zirconium to 0.11 watt per cm. per °C. for the alloy with 7 wt.% tin. At lower temperature the spread is greater. Diagram, graph, table. (P11, Sn, Zr)

245-P. Porosity of Anodic Oxide Coatings on Aluminum. Comparison of *n*-Butane and Krypton Sorption. Lee A. Cosgrove. *Journal of Physical Chemistry,* v. 60, Apr. 1956, p. 385-388.

Surface area and pore volume and diameter of pores in coatings investigated by sorption techniques, using krypton at −195.8° C. and *n*-butane at 0° C. Table, graphs. 14 ref. (P10, L19, Al)

246-P. The Thermodynamic Properties of the Moderately Dilute Liquid Solutions of Copper, Silver and Gold in Thallium, Lead and Bismuth. O. J. Kleppa. *Journal of Physical Chemistry,* v. 60, Apr. 1956, p. 446-452.

Analytical method permits a derivation of important free energy, heat and entropy data from phase diagram information alone. Summary of all available thermodynamic data. Tables, graphs. 14 ref. (P12, M24, Tl, Bi, Pb, Au, Ag, Cu)

247-P. The Heat of Combustion of Calcium. Elmer J. Huber, Jr., and Charles E. Holley, Jr. *Journal of Physical Chemistry,* v. 60, Apr. 1956, p. 498-499.

Calorimetric combustions of calcium metal conducted at an initial temperature of 25° C. under oxygen pressure of 50 atmospheres. Table. 9 ref. (P12, Ca)

248-P. Dimensional Stability of Irradiated Thorium. J. B. Burnham and M. H. Bartz. *Phillips Petroleum (U. S. Atomic Energy Commission), Company, Atomic Energy Division* IDO-16162, Apr. 1954, 10 p.

Twenty Hanford-size thorium slugs were irradiated in two MTR reflector positions. Measurements show that hot rolled thorium is dimensionally stable under irradiation. Diagram, photograph, table. 12 ref. (P10, Th)

249-P. Thermoelectric Powers in Palladium-Silver and Palladium-Rhodium Alloys. J. C. Taylor and B. R. Coles. *Physical Review,* v. 102, ser. 2, Apr. 1, 1956, p. 27-30.

Thermo-electric powers measured in the temperature range 77 to 273° K. Graphs. 16 ref. (P15, Ag, Pd, Rh)

250-P. Modern Magnetic Materials. Malcolm McCaig. *Science Progress,* v. 44, Apr. 1956, p. 224-236.

Types of metallic and nonmetallic materials, their properties and applications. Diagrams, graphs. 7 ref. (P16, SG-n, p)

251-P. (French.) **The Adsorbing Capacity of Hard Materials and Its Relationship With Hardness and Reactivity.** G. F. Hüttig and E. Härtl. *Chimie & Industrie,* v. 75, no. 3, Mar. 1956, p. 503-508.

The adsorptive affinity of $MoSi_2$ and WSi_2 for gaseous ammonia. Theory of relationships between the energy of chemisorption, energy of formation of additive compounds, and energy of the crystalline lattice. Graphs, diagram, table. 9 ref. (P13, P12, Mo, Si, W)

252-P. (Russian.) **Surface Tension of Aluminum and Its Alloys.** A. M. Korol'kov. *Izvestiia Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk,* 1956, no. 2, Feb. 1956, p. 35-42.

Effect of the addition of various metals and of alloy proportions on surface tension and capillary radius. Role of melting method and fluxes employed. Tables, graphs. 29 ref. (P10, Al)

253-P. The Measurement of the Electrical Resistivity of Silicon. R. H.

Creamer. *British Journal of Applied Physics,* v. 7, Apr. 1956, p. 149-150.

Modified four-probe method which employs probes made from wires containing a donor or acceptor-type impurity for *n*- or *p*-type silicon respectively. By discharging a condenser between the probes, low-resistance stable contacts are obtained which allow a steady current to flow in the specimen and permit the potential to be measured with a standard potentiometer. 3 ref. (P15, Si)

254-P. Cyclotron Irradiation Damage of Thorium, Stainless Steel, and Zirconium. F. E. Bowman, A. Andrew, R. R. Eggleston, F. L. Fillmore and C. J. Meechan. *North American Aviation, Inc. (U. S. Atomic Energy Commission),* NAA-SR-287, Apr. 1954, 30 p.

Effects of cyclotron irradation upon the hardness, the stress-strain relationship, and the electrical resistance of thorium, 347 stainless steel, and zirconium. Irradiations were carried out below −100° C. on the 60-in. Crocker cyclotron. Electrical resistance measurements were made at −146° C. and other measurements were made at room temperature. Graphs, micrographs, tables. 9 ref.
(P10, P15, Q29, Th, SS, Zr)

255-P. Interpretation of Domain Patterns Recently Found in BiMn and SiFe Alloys. John B. Goodenough. *Physical Review,* v. 102, ser. 2, Apr. 15, 1956, p. 356-365.

In a demagnetized crystal in which closure domains do not form, the domain pattern on a surface perpendicular to the easy-magnetization axis varies with the thickness of the crystal. Theoretical predictions compared with domain patterns recently observed in BiMn alloys and in barium ferrite. Recently reported domain patterns in polycrystalline SiFe alloys interpreted as representing the latter thick-crystal configuration. Diagrams, graphs. 9 ref. (P16, Bi, Mn, Si, Fe)

256-P. Let's See How Aluminum Building Wire Compares With Copper. *Power,* v. 100, May 1956, p. 122-123.

Data on properties and current-carrying capacities. Diagrams, tables. (P15, Al, Cu)

257-P. Sulfides. John M. Blocher, Jr. Paper from "High-Temperature Technology". John Wiley & Sons. p. 187-207.

Lists sulfides with melting points above 1000° C., thermodynamic and physical properties, methods of preparation. Tables. 60 ref. (P12)

258-P. Melting-Point and Phase-Equilibrium Determinations. S. M. Lang. Paper from "High-Temperature Technology". John Wiley & Sons. p. 409-419.

The following methods are considered: phase identification, static test methods, and dynamic test methods; and general considerations. 44 ref. (P12, M24)

259-P. Thermal Conductivity. Roger J. Runck. Paper from "High-Temperature Technology". John Wiley & Sons. p. 429-446.

Fundamental principles and limits within which they may be employed; types of equipment and variations in design and use. Diagrams. 26 ref. (P11)

260-P. High-Temperature Measurement of Electrical Conductivity. Edward C. Henry. Paper from "High-Temperature Technology". John Wiley & Sons. p. 450-460.

Theory of electrical conduction in semiconductors and insulators; apparatus and methods; results of recent measurements on oxide and other mixtures. Diagrams, graphs. 35 ref. (P15)

261-P. (Dutch.) **Viscosity of Molten Metals.** *Metalen,* v. 11, no. 7, Apr. 15, 1956, p. 153-160.

Viscosity and its influence on the fluid molding of metals. Results with lead-bismuth alloys in a sphere-oscillation viscosimeter. Graphs, photograph, diagrams. 25 ref.
(P10, Pb, Bi)

262-P. (German.) **Measurements of Soft Magnetic Materials by Means of Hall Generator.** Fritz Assmus and Richard Boll. *Elektrotecnische Zeitschrift,* v. 77, Ausgabe A, no. 8, Apr. 1956, p. 234-236.

Measurement of the tangential component of the field intensity in a range of 0.1 to 10 oersteds. Photograph, diagrams, graph. 12 ref. (P16, SG-p)

263-P. (German.) **Effect of Foreign Elements and Heat Treatment on the Electrical Properties of High-Purity Tellurium.** H. Kronmuller, J. Jaumaim and K. Seiler. *Zeitschrift für Naturforschung,* v. 11a, no. 3, Mar. 1956, p. 243-250.

Effect of addition of arsenic, antimony, bromine and iodine in micro quantities on the Hall effect and conductivity at −140 to 300° C. Tables, graphs. 5 ref. (P15, Te)

264-P. (Serbian.) **The Relation Between the Number of Particles in the Specific Volume, the Coefficient of Thermal Linear Expansion and the Heat of Fusion of Metals.** E. N. Do-

brocvetov. *Glasnik Khemiskog Drushtva (Beograd)*, v. 20, no. 3, 1955, p. 181-185.

Data and formulas for 25 metals. Tables. 10 ref. (P10, P11, P12)

265-P. (Book.) **Advances in Electronics and Electron Physics.** L. Marton, editor. v. VII. 527 p. 1955. Academic Press, 125 E. 23rd St., New York, N. Y. $11.50.

Physics of semiconductor materials, theory of the electrical properties of germanium and silicon, characteristic energy losses of electrons in solids, sputtering by ion bombardment, observational radio astronomy, analog computers, electrical discharge in gases and modern electronics. (P15)

266-P. Service Life of Iron Castings Can Be Affected by Their Thermal Conductivity. J. A. Davis, H. W. Deem and H. W. Lownie, Jr. *American Foundrymen's Society, Preprint No.* 56-26, 1956, 3 p.

Quantitative data on the coefficient of thermal conductivity of five irons between 150 and 600° F. Four service conditions which make thermal conductivity an important factor in design and service life. Graph, micrographs, table. (P11, S21, CI)

267-P. Measuring the Thermal Diffusivity of Metals at Elevated Temperatures. M. A. El-Hifni and B. T. Chao. *ASME, Transactions*, v. 78, May, 1956, p. 813-819; disc., p. 820-821.

Apparatus employs a "steady" sinusoidal heat flow in which due account is taken of the influence of small heat loss at the surface of a thin-walled tubular specimen. Table, diagrams, graphs, photograph. 13 ref. (P11)

268-P. The Penetration Depth in Impure Super-Conducting Tin. R. G. Chambers. *Cambridge Philosophical Society, Proceedings*, v. 52, Apr. 1956, p. 363-375.

A new method for measuring the surface impedance of metals at low temperatures and at radiofrequencies. Graphs, tables. 18 ref. (P15, Sn)

269-P. Hydrogen Overpotential on Aluminum. D. J. Hansen and F. E. W. Wetmore. *Canadian Journal of Chemistry*, v. 34, May 1956, p. 659-664.

Hydrogen overpotential of pure and impure aluminum in 0.1 *N* H_2SO_4 at 25° C.; effect of autocorrosion; role of impurities in determining the overpotential and the rest potential. Graphs, tables. 8 ref. (P15, Al)

270-P. Determination of the Activity of Sodium in Sodium-Lead Alloys at High Temperatures. Bernard Porter and Morris Feinleib. *Electrochemical Society, Journal*, v. 103, May 1956, p. 300-303.

The e.m.f. of cells (Na (pure)/Na^+/Na in Pb) was directly measured up to 820° C, using alumina containers impregnated with sodium carbonate in an argon atmosphere. Results were converted to activities and extrapolated to 1010° C. Diagrams, graphs, tables. 2 ref. (P12, Pb, Na)

271-P. Low Temperature Thermal Expansion of Various Materials. Henry L. Laquer. *Los Alamos Scientific Laboratory (U. S. Atomic Energy Commission)*, AECD-3706, Dec. 1952, 58 p.

Expansion of 15 metals and miscellaneous substances measured; literature data for other materials were collected. Diagram, tables, graphs. 71 ref. (P11)

272-P. Photoconductivity in Manganese-Doped Germanium. R. Newman, H. H. Woodbury and W. W. Tyler. *Physical Review*, v. 102, ser. 2, May 1, 1956, p. 613-617.

Impurity photoconduction observed in *n*- and *p*-type manganese-doped germanium at low temperatures. The spectra are consistent with the published ionization energy values determined from conductivity data. Graphs. 14 ref. (P15)

273-P. Scattering of Carriers From Doubly Charged Impurity Sites in Germanium. W. W. Tyler and H. H. Woodbury. *Physical Review*, v. 102, ser. 2, May 1, 1956, p. 647-655.

The effect of doubly charged impurity sites on the mobility of carriers was observed in both equilibrium and photoconductivity measurements. Graphs. 20 ref. (P15, Ge)

274-P. Atomic Heats of Normal and Superconducting Vanadium. W. S. Corak, B. B. Goodman, C. B. Satterthwaite and A. Wexler. *Physical Review*, v. 102, ser. 2, May 1, 1956, p. 656-661.

Atomic heats of vanadium determined from just above the transition temperature, $T_c = 5.03°$ K., down to 1.1° K. Graphs, tables. 19 ref. (P12, V)

275-P. Atomic Heats of Normal and Superconducting Tin Between 1.2° and 4.5° K. W. S. Corak and C. B. Satterthwaite. *Physical Review*, v. 102, ser. 2, May 1, 1956, p. 662-666.

Atomic heat measurements on tin in the normal and superconducting states revealed that the electronic contribution to the atomic heat in the superconducting state, C_{es}, could

be represented below about 0.7 T_c by the same exponential expression found applicable to vanadium. Graphs, tables. 11 ref. (P12, Sn)

276-P. Resistivity of Interstitial Atoms and Vacancies in Copper. A. W. Overhauser and R. L. Gorman. *Physical Review,* v. 102, ser. 2, May 1, 1956, p. 676-681.

Residual resistivity associated with the presence of interstitial atoms or vacancies in copper is studied with particular attention devoted to the scattering of conduction electrons resulting from lattice distortions surrounding the imperfections. Tables. 12 ref. (P15, M26, Cu)

277-P. Effects of Gamma Radiation on Germanium. J. W. Cleland, J. H. Crawford, Jr., and D. K. Holmes. *Physical Review,* v. 102, ser. 2, May 1, 1956, p. 722-724.

Studies of the effect of gamma radiation on the electrical properties of germanium, chosen because of its very great sensitivity to fast-particle bombardment. Graph. 15 ref. (P15, Ge)

278-P. Investigation of Sintered Metals by Means of Over-Voltage Measurements. E. Cremer and P. Hittmair. *Powder Metallurgy Bulletin,* v. 7, Apr. 1956, p. 82-87.

The para-hydrogen transformation was used as a test reaction. Effects of sintering temperature and compacting pressure of compacts prepared from carbonyl nickel and carbonyl cobalt powders investigated. Diagram, graph, micrographs, table. 5 ref. (P15, H14, H15)

279-P. Thermal Expansion of Zirconium and Zirconium-Tin Alloys Up to 570° C. Marvin Moskowitz and L. W. Kates. *Sylvania Electric Products, Inc., Metallurgical Laboratory (U. S. Atomic Energy Commission),* SEP-91, June 1952, 12 p.

Data obtained from thermal linear expansion measurements were used to derive separate second degree equations for each specimen, relating length and temperature. Graphs, micrographs, table. 1 ref. (P11, Sn, Zr)

280-P. (English). **Statistical Mechanics of Irreversible Processes. VI. Thermal Conductivity of Crystals.** R. Brout and I. Prigogine. *Physica,* v. 22, no. 4, Apr. 1956, p. 263-272.

A molecular theory of thermal conductivity is obtained. 7 ref. (P11)

281-P. (German.) **Hall Effect and Electrical Resistance of In-Sb in Strong Magnetic Fields and High Pressure.** Johannes Gielessen and Kurt Hans V. Klitzing. *Zeitschrift für Physik,* v. 145, no. 2, 1956, p. 151-155.

Measurements under increasing pressures up to 7400 kg. per. sq.cm. and under magnetic field up to $\mu_o = 1.4$ Wb/m^2. Graphs, diagrams. 3 ref. (P15, P16, In, Sb)

282-P. (Japanese.) **Interfacial Tension Between Molten Iron and Slags.** Kazumi Moir and Tadato Fujimura. *Iron & Steel Institute of Japan, Journal,* v. 41, no. 5, May 1955, p. 495-500.

Method for determining the interfacial tension between molten iron and slag consists of photographing the sessile drop of the molten iron by X-ray, measuring the dimensions of the drop by means of a microcomparater, and calculating the interfacial tension using the Bashforth-Adams table. Diagrams, graphs, tables, 19 ref. (P10, B21, Fe)

283-P. (Russian.) **Interrelation Between the Anisotropy of the Hall Effect and the Variation in the Resistance of Metals in a Magnetic Field. I. Investigation of Zinc.** E. S. Borovik. *Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki,* v. 30, no. 2, Feb. 1956, p. 262-271.

Relation of resistance and the Hall field for zinc to the magnitude of the angle between the axis of symmetry of the sixth order and the magnetic field in fields of up to 25,000 oersteds at temperatures of 4 and 20° C. Theoretical explanation of regularities observed. Graphs. 21 ref. (P15, Zn)

284-P. (Russian.) **Comparison of Physical-Chemical Properties of Carbides.** I. S. Gaev. *Zhurnal Neorganicheskoi Khimii,* v. 1, no. 2, Feb. 1956, p. 193-211.

Physical-chemical properties of carbides as such and carbides in steels. Tables, graphs. 53 ref. (P general, N8, ST, C-n)

285-P. (Russian.) **Enthalpy of Formation of Compounds of Zinc With Antimony.** S. A. Shchukarev, M. P. Morozova and Iu. P. Sapozhnikov. *Zhurnal Obshchei Khimii,* v. 26, no. 2, Feb. 1956, p. 304-307.

Possible reasons for abundance of thermodynamically stable forms in bimetallic systems as compared with systems of metal and nonmetal. 9 ref. (P12, Zn, Sb)

286-P. Iron-Aluminum Alloys for Use in Magnetostrictive Transducers. Miles T. Pigott. *Acoustical Society of America, Journal,* v. 28, May 1956, p. 343-346.

Electromechanical coupling coefficient determined for iron-aluminum alloys containing 12-14% aluminum and annealed at temperatures between 600 and 1100° C. Tables, graphs. 12 ref. (P16, Fe, Al)

287-P. Change of the Absolute Thermoelectric Power and Electrical Resistivity of Copper by Cold-Working at Liquid Air and Room Temperature. M. J. Druyvesteyn and D. J. van Ooijen. *Applied Scientific Research,* v. 5, sec. B, no. 6, 1956, p. 437-441.

Cold working at liquid air temperature affects the thermo-electric power and the resistivity more strongly than cold working at room temperature. Graphs. 3 ref. (P15, Cu)

288-P. Thermoelectric Power of AuCu in Nonequilibrium States. H. Cooper, P. Schwed and R. W. Webeler. *Journal of Applied Physics,* v. 27, May 1956, p. 516-518.

Measurements made of the variation of the resistivity and of the thermo-electric power during annealing at several temperatures of thermally disordered and of mechanically disordered samples of gold-copper alloys. Graphs. 4 ref. (P15, Au, Cu)

289-P. The Distribution of Copper Between Germanium and Ternary Melts Saturated With Germanium. C. D. Thurmond and R. A. Logan. *Journal of Physical Chemistry,* v. 60, May 1956, p. 591-595.

Solubility of copper in solid germanium measured as a function of the copper concentration in ternary germanium-copper-lead melts saturated with germanium at 700° C. Graphs. 19 ref. (P13, N12, Cu, Ge)

290-P. The Magnetic Susceptibilities of Copper, Silver and Gold, and Errors in the Gouy Method. W. G. Henry and J. L. Rogers. *Philosophical Magazine,* v. 1, 8th ser., no. 3, Mar. 1956, p. 223-236.

Direct determination is made of the absolute magnetic mass susceptibility, with consideration given to the correction for ferromagnetic impurities. The method of calibrating the field by a current-carrying loop and of making allowance for the variation of the field strength in the plane normal to the axis of the specimen given in detail. Graphs, tables, diagram. 16 ref. (P16, Cu, Ag, Au)

291-P. The Magnetic Susceptibilities of Some Diamagnetic Alloys: The Primary Solid Solutions of Zinc, Gallium, Germanium and Arsenic in Copper. W. G. Henry and J. L. Rogers. *Philosophical Magazine,* v. 1, 8th ser., no. 3, Mar. 1956, p. 237-252.

Rates of change of susceptibility, with concentration in the solid solution region of the four systems. Magnetic properties and alloy preparation. Tables, graphs, diagrams. 28 ref. (P16, Cu, Zn, Ga, Ge, As)

292-P. Optical Absorption of Copper and Silver at 4.2° K. Manfred A. Biondi. *Physical Review,* v. 102, ser. 2, May 15, 1956, p. 964-967.

Absorptivity measured as a function of wavelength over the visible and near-infrared regions. Table, diagrams, graphs. 15 ref. (P17, Ag, Cu)

293-P. Paramagnetic Effect in Superconducting Tin, Indium, and Thallium. James C. Thompson. *Physical Review,* v. 102, ser. 2, May 15, 1956, p. 1004-1008.

Measurements on the longitudinal magnetization of pure rods in the intermediate state between normal and superconduction. Diagram, graphs, table. 9 ref. (P16, P15, Tl, In, Sn)

294-P. The Variation With Temperature of the Spectral Emissivities of Iron, Nickel and Cobalt. L. Ward. *Physical Society, Proceedings,* v. 69, no. 435B, Mar. 1956, p. 339-343.

In iron and cobalt, a fairly abrupt change in emissivity occurs at temperatures near the Curie points. Graphs, tables, diagram. 8 ref. (P17, Co, Fe, Ni)

295-P. (English.) Magnetic After-Effect in Ni_2Mn Alloy. Tadami Taoka. *Physical Soicety of Japan, Journal,* v. 11, no. 5, May 1956, p. 537-547.

After-effect is large at the intermediate state of order of the alloy, is most noticeable at the steepest part of the magnetization curve, is comparatively temperature insensitive, and is not affected by mechanical deformation. Micrographs, table, diagrams, graphs. 18 ref. (P16, Ni, Mn)

296-P. (English.) Note on the Paramagnetic Susceptibility and the Gyromagnetic Ratio in Metals. Ryogo Kubo and Yukio Obata. *Physical Society of Japan, Journal,* v. 11, no. 5, May 1956, p. 547-550.

Although the orbital magnetic moments of the electrons in metals are "quenched" by the crystal field, their contribution to the paramagnetic susceptibility for partly filled degenerate bands is shown to be of

the same order of magnitude as the Pauli spin paramagnetism. Graph. 5 ref. (P16)

297-P. (English.) **Study of Magnetic Annealing of Ni_3Fe Single Crystal.** Soshin Chikazumi. *Physical Society of Japan, Journal,* v. 11, no. 5, May 1956, p. 551-558.

Magnetic anistropy induced by magnetic annealing measured for Ni_3Fe single crystal by means of a high-temperature torque magnetometer. Diagrams, table, graphs. 5 ref. (P16, Ni, Fe)

298-P. (English.) **On the Positions of the Equivalent Poles on a Magnetized Bar Tested by the Magnetometer Method. III. Electrolytic Iron and Mo-Cr Permalloy.** Hakaru Masumoto and Makoto Sugihara. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 7, no. 5, Oct. 1955, p. 425-432.

The positions of equivalent poles of specimens are remarkably influenced by the relative position of the magnetized specimen and the magnetometer, the distance between them, the states of magnetization of specimens, and the type of material. Tables, graphs. 3 ref. (P16, Fe, Ni)

299-P. (English.) **Study on the Transformation of Zinc by Electric Resistance in Connection With Eutectic Phenomena.** Mitsuru Sato and Toshiro Suzuoka. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 7, no. 5, Oct. 1955, p. 433-442.

Precise measurements of the electric resistance of pure zinc made at high temperatures; anomalous changes were observed at 170, 200, 230 and 320° C. Graphs, tables, diagrams. 28 ref. (P15, N11, Zn)

300-P. (English.) **Paramagnetism of Tin Observed at the Superconducting Transition.** Yushio Shibuya and Seiichi Tanuma. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 7, no. 6, Dec. 1955, p. 549-567.

Measurements were made on tin cylinders in the presence of an external magnetic field and with an externally supplied current at the superconducting transition. It was ascertained that the paramagnetic effect is not such an apparent one as once supposed, but an intrinsic one without hysteresis. Diagrams, graphs. 22 ref. (P16, N11, Sn)

301-P. (English.) **Attenuation of the Ultrasonic Waves in Metals. I. Aluminium.** Tokutaro Hirone and Kazuo Kamigaki. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 7, no. 5, Oct. 1955, p. 455-464.

Attenuation coefficients of longitudinal ultrasonic waves in aluminum measured by pulsed ultrasonic waves at frequencies ranging from 2 to 25 mc. per sec. Table, micrographs, graphs, diagrams, oscillograms. 9 ref. (P10, Al)

302-P. (English.) **Anomaly of Specific Heat in α-Phase Alloys of Copper and Aluminium.** Hakaru Masumoto, Hideo Saito and Minoru Takahashi. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 7, no. 5, Oct. 1955, p. 465-468.

Specific heats of 12 copper alloys containing less than 14.59% of aluminum measured at high temperatures at annealed and heat treated states by the inverse rate curve method. Tables, graphs. (P12, N10, Cu, Al)

303-P. (English.) **On the Activities of Si and C in Molten Fe-Si-C Alloys.** Masayasu Ohtani. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 7, no. 5, Oct. 1955, p. 487-501.

An electrochemical study of alloys in the liquid phase; solubility change of graphite on the addition of silicon; effect of carbon upon the activity of each solute. Diagrams, graphs, tables, photograms. 19 ref. (P12, Si, Fe)

304-P. (English.) **Influence of Addition of Nickel on the Thermal Expansion, Rigidity Modulus and Its Temperature Coefficient of the Alloys of Cobalt, Iron, and Chromium, Especially of Co-Elinvar. II. Additions of 30 and 40% of Nickel.** Hakaru Masumoto, Hideo Saito and Yutaka Sugai. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 7, no. 6, Dec. 1955, p. 533-540.

Studies at temperatures from 10 to 50° C. Tables, graphs. 3 ref. (P11, Q1, Cr, Co, Fe, Ni)

305-P. (English.) **Singularity in Pure Zinc at High Temperatures.** Toshiro Suzuoka and Tokihiro Kuroyanagi. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 7, no. 6, Dec. 1955, p. 541-548.

Measurements of electrical resistance at various temperatures and effects of quenching on specific gravity disclosed no anomalies in behavior from room temperature up to the melting point. Graphs, tables, diagram. 36 ref. (P15, P10, Zn)

306-P. (German.) **Conductivity Theory of Metals at Low Temperatures.** B. Mühlschlegel. *Annalen der Physik,* v. 17, no. 4-5, 1956, p. 199-213.

Metal electron transport in presence of electrical field and temperature gradients. Diagrams. 13 ref. (P15)

307-P. (German.) **Magnetic Powder Specimens of Cobalt at High Temperatures.** Wilfried Andrä. *Annalen der Physik,* v. 17, no. 4-5, 1956, p. 233-235.

Observation of magnetic changes in crystals of cobalt suspended in a mixture of iron oxide and paraffin. Micrographs. (P16, H11, Co)

308-P. (German.) **Theory of Sound Velocity in Metals.** Karl-Heinz Schramm. *Annalen der Physik,* v. 17, no. 4-5, 1956, p. 242-248.

Relationship between propagation velocity of small disturbances of the conducting electrons of a metal, and the ones of the ionic system. Derivation of a corresponding formula. Tables, diagram. 5 ref. (P10)

309-P. An Analysis of the Available Data on the Total Heat of Commercial Steels. J. R. Pattison. *Iron and Steel Institute, Journal,* v. 183, May 1956, p. 64-68.

Most reliable data relate to a 4% silicon steel. No other data for temperatures above 1300° C., for any steel, are yet available, and existing data for the range of temperatures up to 1300° C. are of unproven reliability. Tables, graph. 16 ref. (P12, ST)

310-P. Anomalous Electron Emission From Metallic Surfaces. Franz R. Brotzen. *Naval Research Laboratory, NRL Report* 4733, Apr. 1956, 10 pages.

Low-melting metals and alloys were heated in a Geiger-Muller free-flow tube and electron emission from their surfaces was observed. Graphs, diagram. 33 ref. (P15, SG-d)

311-P. An Electrical Resistivity Study of Lattice Defects Introduced in Copper by 1.25 Mev Electron Irradiation at 80° K. C. J. Meechan and J. A. Brinkman. *North American Aviation, Inc., Atomics International (U. S. Atomic Energy Commission),* NAA-SR-1571, Apr. 1956, 35 pages.

A recovery state centered near room temperature exhibited a phenomenological activation energy of 0.60 ± 0.01 e.v. and obeyed a second order chemical rate equation. Diagram, graphs, tables. 23 ref. (P13, P15, Cu)

312-P. Simultaneous Measurements of Density, Viscosity, and Electric Conductivity of Melts. J. D. Mackenzie. *Review of Scientific Instruments,* v. 27, May 1956, p. 297-299.

Apparatus for measurements at high temperatures. Vacuum fusion is possible in the same apparatus. Diagrams, graphs. 6 ref. (P10, P15)

313-P. Thermal and Electrical Conductivities of the Alkali Metals at Low Temperatures. D. K. C. MacDonald, G. K. White and S. B. Woods. *Royal Society, Proceedings,* v. 235, ser. A, May 8, 1956, p. 358-374.

Measurements were made on very pure lithium, sodium, potassium, rubidium and cesium down to temperatures at low as 2° K. Tables, graphs. 47 ref. (P11, P15, Cs, Rb, K, Na, Li)

314-P. (English.) **Effect of Manganese Content on the Thermal Expansion Coefficient and Magnetic Properties of the So-Called Dumet Iron-Nickel Alloys.** T. Millner and R. Welesz. *Acta Technica Academiae Scientiarum Hungaricae,* v. 14, no. 3-4, 1956, p. 279-291.

Great pains must be taken to keep the manganese content at a low level and to control the manganese content in the application of such alloys for leads in vacuum tubes. Diagram, graphs, tables. 6 ref. (P11, P16, T1, Fe, Ni)

315-P. (French.) **Measurement of Electrolysis.** R. Piontelli, G. Montanelli and G. Sternheim. *Revue de Métallurgie,* v. 53, no. 4, Apr. 1956, p. 248-254; disc., p. 254.

General information and practical examples of methods used in presence of melted salt baths. Diagrams, graphs. 9 ref. (P15)

316-P. (German.) **Determination of Softening Temperature in Quality Control of Oxygen-Containing Copper Rod.** Sven Lundquist and Sölve Carlén. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 9, no. 4, Apr. 1956, p. 145-151.

Softening temperature as an indicator of various technological properties. Tables, graphs, photographs. 4 ref. (P12, Cu)

317-P. (Russian.) **Density and Surface Tension of Liquid Technical Titanium.** V. P. Eliutin and M. Maurakh. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnisheckikh Nauk,* no. 4, Apr. 1956, p. 129-131.

Methods of coping with difficulties (high melting temperature and increased chemical activity) of determining surface tension of high-melting metals. Diagrams, table. 6 ref. (P10, Ti)

318-P. (Russian.) **Temperature Dependence of the Magnetostriction of**

Ferromagnetic Alloys. D. I. Volkov, V. I. Chechernikov and V. B. Tseitlin. *Moskovskogo Universiteta, Vestnik, Seriia Fiziko-Matematicheskikh i Estestvennykh Nauk,* v. 11, no. 2, Feb. 1956, p. 21-28.

A study of the temperature dependence of the magnetostriction of saturation of ferromagnetic alloys of nickel with copper, manganese, iron and cobalt. Results corroborate the theoretically found linear law of change of magnetostriction with temperature in the vicinity of the Curie point. Graphs. 15 ref. (P16, Ni, Cu, Mn, Fe, Co)

319-P. Some Aspects of Liquid Metals. L. H. J. Harper. *Birmingham Metallurgical Society, Journal,* v. 36, Mar. 1956, p. 346-359.

Structure, properties, viscosity-composition relationships, fludity, liquid metal pumps. Table, graphs, diagram. 16 ref. (P general, M26)

320-P. Paramagnetism of the γ Phase in Copper-Manganese Alloys. H. P. Myers. *Canadian Journal of Physics,* v. 34, June 1956, p. 527-534.

Measurements of paramagnetic susceptibility and its variation with temperature in alloys having compositions from 10 to 90 at. % manganese. Graphs. 6 ref. (P16, Mn, Cu)

321-P. Anodic Transients of Copper in Hydrochloric Acid. Ralph S. Cooper. *Electrochemical Society, Journal,* v. 103, June 1956, p. 307-315.

Transients were studied using horizontal anodes shielded to prevent convection. Results were in quantitative agreement with Müller's theory except for a second plateau due to the initiation of a new reaction involving the OH ion. Tables, diagrams, graphs. 13 ref. (P15, Cu)

322-P. Electrokinetic Potentials on Bulk Metals by Streaming Current Measurements. II. Gold, Platinum, and Silver in Dilute Aqueous Electrolytes. Ray M. Hurd and Norman Hackerman. *Electrochemical Society, Journal,* v. 103, June 1956, p. 316-319.

Potentials measured in distilled water, potassium chloride and potassium hydroxide. Graph, tables, diagrams. 6 ref. (P15, Au, Pt, Ag)

323-P. Galvanic Potentials of Grains and Grain Boundaries in Copper Alloys. R. Bakish and W. D. Robertson. *Electrochemical Society, Journal,* v. 103, June 1956, p. 320-325.

The measured potentials could be correlated directly with observed structural changes and susceptibility to stress corrosion cracking. Diagram, table, graphs. 9 ref. (P15, R1, M27, Cu)

324-P. Effect of Strain on the Work Function of Polycrystalline Silver. George Wallis and H. E. Farnsworth. *Journal of Applied Physics,* v. 27, June 1956, p. 594-598.

Contact potential difference measurements indicate that mechanically induced strain of the order of 1% in polycrystalline strips of silver produces an increase in work function of between 0.01 and 0.03 e.v. Table, graphs, diagram. 8 ref. (P15, Ag)

325-P. Some Resistivity Effects of Short-Range Order in α Brass. A. C. Damask. *Journal of Applied Physics,* v. 27, June 1956, p. 610-616.

The annealing kinetics of resistance changes produced in 30% zinc α brass by quench, neutron irradiation at 50° C. and cold work. Graphs. 34 ref. (P15, N10, Cu, Zn)

326-P. Sulfur Pressure Measurements Above FeS in Equilibrium With Iron. C. L. McCabe, C. B. Alcock and R. G. Hudson. *Journal of Metals,* v. 8, May 1956, p. 693-694.

Measurements by the Knudson orifice method gave good agreement with previous determinations. Graphs, tables. 11 ref. (P13, Fe)

327-P. Melting Point Determination of Hafnium, Zirconium, and Titanium. D. K. Deardorff and Earl T. Hayes. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, May 1956, p. 509-511.

Technique of determination is improved by gradient heating and refinements in cavity preparation to obtain true black-body conditions. Diagram, tables. 4 ref. (P12, Hf, Zr, Ti)

328-P. On the Relationship Between Resistivity and Lifetime in Semiconductors. Wolfgang Gärtner. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, May 1956, p. 612-613.

Traps are much more effective in low resistivity material, thus reducing the carrier lifetime. Graphs. 9 ref. (P15)

329-P. Weak Field Magnetoresistance of *n*-Type Germanium. Colman Goldberg and R. E. Davis. *Physical Review,* v. 102, ser. 2, June 1, 1956, p. 1254-1257.

Measurements are in agreement

with the model that assumes that the energy surfaces are ellipsoids oriented along the (111) directions in k-space. Graphs, table. 10 ref. (P15, P16, M26, Ge)

330-P. Heat Capacity of Titanium Between 4° K and 15° K. M. H. Aven, R. S. Craig, T. R. Waite and W. E. Wallace. *Physical Review,* v. 102, ser. 2, June 1, 1956, p. 1263-1264.

Measurement procedure and results. Graph, table. 3 ref. (P12, Ti)

331-P. Temperature Dependence of the Hall Coefficients in Some Copper-Nickel Alloys. F. E. Allison and Emerson M. Pugh. *Physical Review,* v. 102, ser. 2, June 1, 1956, p. 1281-1287.

The two Hall coefficients and the resistivity of alloys containing 60%, 70% and 80 % nickel measured from 4 to 400° K. Graphs, tables, diagram. 20 ref. (P15, Ni, Cu)

332-P. Domain Structure as Affected by the Uniaxial Ferromagnetic Anisotropy Induced in Cubic Solid Solutions. Mikio Yamamoto, Satoshi Taniguchi and Keizo Aoyagi. *Physical Review,* v. 102, ser. 2, June 1, 1956, p. 1295-1297.

Perminvar-type magnetic properties are due to the stabilization of domain walls by the induced uniaxial anisotropy in face-centered cubic solid solutions and in body-centered cubic solid solutions with negative cubic anisotropy constants. Diagram, micrographs. 8 ref. (P16, SG-n)

333-P. (English.) **On Thermodynamical Analysis by Calorimetry Alone.** J. L. Meijering. *Acta Metallurgica,* v. 4, no. 3, May 1956, p. 333-335.

Principles, advantages and applications. Diagrams. 3 ref. (P12)

334-P. (Russian.) **Resistance of Steel to Alternating Current.** B. B. Timofeev. *Elektrichestvo,* 1956, no. 5, May 1956, p. 50-54.

Simplified method of calculating resistance to sinusoidal alternating current of a massive low-carbon steel conductor with low and medium intensities of magnetic field on its surface. Graphs. 4 ref. (P15, P16, CN)

335-P. (Russian.) **Electroconductivity of Certain Compounds of Transition Metals With Boron, Carbon, and Nitrogen, and of Their Alloys.** G. V. Samsonov. *Zhurnal Tekhnicheskoi Fiziki,* v. 26, no. 4, Apr. 1956, p. 716-722.

The resistivity of a number of borides, carbides, and nitrides of transition metals, and also of their mutual and mixed alloys. Relation between resistivity and the deficient electron levels. Tables, graphs. 29 ref. (P15)

336-P. Mass Transfer in Liquid Metals. W. E. Dunn, C. F. Bonilla, C. Ferstenberg and B. Gross. *A.I.Ch.E. Journal,* v. 2, June 1956, p. 184-189.

Experiments on the dissolving of horizontal metal cylinders by mercury in natural convection and of zinc tubes and beds of lead shot by mercury in forced convection agreed with the best available dimensionless correlations for mass transfer in nonmetals under the same conditions. (P10, R6, Hg, Zn, Cd, Pb, Sn)

337-P. Thermal Electromotive Force of Uranium, Titanium, and Zirconium. L. L. Wyman and J. F. Bradley. *Knolls Atomic Power Laboratory (U. S. Atomic Energy Commission),* KAPL-852, Dec. 1952, 20 p.

Thermal electromotive force of thermocouples as function of temperature; effect of variables such as cold working, annealing and thermal cycling upon electromotive force of uranium-platinum thermocouple. (P15, S16, U, Ti, Zr)

338-P. Spectral Emissivity of Rhenium. D. T. F. Marple. *Optical Society of America, Journal,* v. 46, July 1956, p. 490-494.

Method of measurement and equipment; comparison with previous experiments and the theory. (P17, Re)

339-P. Hall Coefficient and Thermoelectric Power of Thorium Metal. Joseph H. Bodine, Jr., *Physical Review,* v. 102, ser. 2, June 15, 1956, p. 1459.

The Hall coefficient of two samples of thorium metal was measured at room temperature in magnetic fields on the order of 4000 gauss, and an average value of -1.2×10^{-11} v.—cm. per abampere gauss obtained. (P15, Th)

340-P. Hall Effect in Gray Tin Filaments. E. E. Kohnke and A. W. Ewald. *Physical Review,* v. 102, ser. 2, June 15, 1956, p. 1481-1486.

In contradiction to the results for *n*-type samples, *p*-type samples indicate mobility ratios slightly higher than unity. The field dependence of the Hall coefficient of *p*-type specimens shows a shift of the crossover to higher temperatures with increasing magnetic field. (P15, P16, Sn)

341-P. Components of the Thermodynamic Functions of Iron. R. J.

Weiss and K. J. Tauer. *Physical Review*, v. 102, ser. 2, June 15, 1956, p. 1490-1495.

The functions enthalpy, entropy and free energy of alpha and gamma iron are determined from existing data and resolved into their magnetic, lattice and electronic components on the basis of additivity of the respective specific heat components. (P12, Fe)

342-P. Investigation of the Superconductivity of Hafnium. Robert A. Hein. *Physical Review*, v. 102, ser. 2, June 15, 1956, p. 1511-1518.

Indicates that pure hafnium is probably not a superconductor down to a temperature of 0.08° K. (P15, Hf)

343-P. The Electrical Conductivity of Anisotropic Thin Films. R. Englman and E. H. Sondheimer. *Physical Society Proceedings*, v. 69, no. 436B, Apr. 1956, p. 449-458.

When the electron free path is large, the theoretical electrical conductivity of single crystal metal films exhibit anomalous anisotropic properties similar to, but even more pronounced than, those found in the anomalous skin effect in anisotropic metals. (P15)

344-P. Heat Capacity of Silver Below 4-2°K. J. A. Rayne. *Physical Society, Proceedings*, v. 69, no. 436B, Apr. 1956, p. 482-483.

Experimental measurements. (P12, Ag)

345-P. Electron and Nuclear Spin Resonance and Magnetic Susceptibility Experiments on Dilute Alloys of Mn in Cu. J. Owen, M. Browne, W. D. Knight and C. Kittel. *Physical Review*, v. 102, ser. 2, June 15, 1956, p. 1501-1507.

Simple model leads to the prediction of indirect exchange ferromagnetism; electronic Knight shift of the electron spin resonance line; nuclear Knight shift of the copper nuclear resonance; electron spin relaxation by the coupling with the conduction electrons; and a contribution to the electrical resistivity by the Elliott-Schmitt mechanism. (P16, Mn, Cu)

346-P. (German.) **Potential-Forming Phenomena on Austenite Chromium-Nickel Steels in Distilled Water and in Neutral Halogen Salt Solutions.** Carl Carius. *Archiv für das Eisenhüttenwesen*, v. 27, no. 5, May 1956, p. 323-335.

Effect of various etching agents on potential. Steel-oxygen electrode and its reversibility. (P15, AY)

347-P. (German.) **Powder Specimen and Magnetizing Processes in Highly Coercive Alnico Magnets.** A. Kussmann and J. H. Wollenberger. *Zeitschrift für Angewandte Physik*, v. 8, no. 5, May 1956, p. 213-216.

Detection of magnetic zone-structures of Alnico permanent magnets of high coercivity by Bitter method. (P16, SG-n)

348-P. (Russian.) **Investigation of the Influence of Diffused Hydrogen on the Potential of Iron in Alkaline Solutions.** I. A. Bagotskaia. *Doklady Akademii Nauk SSSR*, v. 107, no. 6, June 1956, p. 843-846.

An experimental study of the influence of diffusing atomic hydrogen on the potential of iron in an electrolytic solution of sodium hydroxide. (P15, Fe)

349-P. (Russian.) **Thermodynamic Description of the Magnetization of Ferromagnetic Substances Near the Curie Temperature.** K. P. Belov and A. N. Goriaga. *Fizika Metallov i Metallovedenie*, v. 2, no. 1, 1956, p. 3-9.

Measurements of true magnetization of nickel and several nickel alloys in the vicinity of the Curie point. Method of determining relation between temperature and spontaneous magnetization. (P16, Ni)

350-P. (Russian.) **Interrelation of the Anisotropy of the Hall Effect and the Variation of Resistance in a Magnetic Field. I. Study of Tin and Indium.** E. S. Borovik. *Fizika Metallov i Metallovedenie*, v. 2, no. 1, 1956, p. 33-42.

Interrelation is studied at 4°C. for indium and at 4 and 20 °C. for tin, in fields up to 5000 oersteds. Anisotropy of mobility of electrons and holes is calculated for a model with two groups of holes and electrons. (P15, P16, Sn, In)

351-P. (Russian.) **Influence of Manganese, Chromium, and Vanadium on the Surface Tension of Liquid Iron (Steel).** T. P. Kolesnikova and A. M. Samarin. *Izvestiia akademii Nauk SSSR, Otdelenie Tekhnichesikikh Nauk*, no. 5, May 1956, p. 63-69.

Determination of surface tension by the method of gas bubbles, with consideration of oxygen content and nonmetallic inclusions. (P10, ST, Fe)

352-P. (Russian.) **Dependence of Overvoltage on the Electrode Material.** R. M. Vasenin. *Zhurnal Fizicheskoi Khimii*, v. 30, no. 3, Mar. 1956, p. 629-638.

If different materials are used as electron transmitters for the hydrogen electrode the potential difference of metal solution in contrast to the

usually measured potential of the hydrogen electrode will depend upon the nature of the metal. (P15)

353-P. Measurement of Specific Heats by a Pulse Method. Richard C. Strittmater and Gordon C. Danielson. *Ames Laboratory (U. S. Atomic Energy Commission)*, ISC-666, Aug. 1955, 27 p.

The apparatus delivers a current of sufficient magnitude to heat a fine wire sample to a melting temperature in a short time. By simultaneous recording with a dual-beam cathode ray oscilloscope, the current through and the potential across a sample, one can determine at any instant the power input and the resistance of the wire. (P12)

354-P. Intermetallic Semiconductors. H. J. Hrostowski. *Bell Laboratories Record,* v. 34, July 1956, p. 246-250.

It may be possible to produce more versatile transistors and other semiconductor devices using intermetallic compounds with a wider range of electrical properties than is obtainable with silicon and germanium. (P15)

355-P. Reaction of Hydrogen With Uranium. W. M. Albrecht and M. W. Mallett. *Electrochemical Society, Journal,* v. 103, July 1956, p. 404-409.

The reaction was found to follow a linear rate law after initial deviations. The data indicate at least two different rate-controlling processes in the temperature and pressure ranges investigated. (P13, U)

356-P. Irradiation of Germanium by Fast Monoenergetic Neutrons. J. W. Moyer, W. A. Smith, Jr., and O. L. Cunningham. *Knolls Atomic Power Laboratory (U. S. Atomic Energy Commission)* KAPL-1455, May 1956, 33 p.

The effect upon the electrical resistivity and the Hall coefficient was studied. Changes in carrier concentrations were observed in the case of gold-doped materials. (P15, Ge)

357-P. Impurity Band Conduction in Germanium and Silicon. Esther M. Conwell. *Physical Review,* v. 103, ser. 2, July 1, 1956, p. 51-61.

Theoretical discussion. (P15, Ge, Si)

358-P. Galvanomagnetic Theory for Electrons in Germanium and Silicon: Magnetoresistance in the High-Field Saturation Limit. Louis Gold and Laura M. Roth. *Physical Review,* v. 103, ser. 2, July 1, 1956, p. 61-66.

For constant scattering time r and ellipsoidal energy surfaces, the Boltzmann transport equation reduces to a phenomenological equation of motion for electrons from which a conductivity tensor is derived. (P15, P16, Ge, Si)

359-P. Electrical Conduction in Magnesium Stannide at Low Temperatures. H. P. R. Frederikse, W. R. Hosler and D. E. Roberts. *Physical Review,* v. 103, ser. 2, July 1, 1956, p. 67-72.

Measurements of conductivity, Hall effect and magnetoresistance in the helium range suggest that conduction takes place in a surface layer rather than in the bulk of the sample. (P15, Mg, Sn)

360-P. Scattering of Electrons From Clustered Vacancies in Copper. D. L. Dexter. *Physical Review,* v. 103, ser. 2, July 1, 1956, p. 107-110.

Excess resistivity and resistivity per unit stored energy calculated. (P15, Cu)

361-P. Possible Approach to the Low-Temperature Resistance Maximum in Dilute Alloys of Transition Metals in Noble Metals. R. W. Schmitt. *Physical Review,* v. 103, ser. 2, July 1, 1956, p. 83-87.

The temperature at which the maximum occurs varies rapidly with concentration of the transition metal. The magnetoresistance is negative up to some temperature higher than the temperature at which the maximum in resistivity occurs. (P15, P16, EG-c)

362-P. (English.) The Magnetic Properties of Chromium-Tellurium-Selenium System. Ichiro Tsubokawa. *Physical Society of Japan, Journal,* v. 11, No. 6, June 1956, p. 662-665.

The change of magnetic properties due to the replacement of tellurium by selenium in chromium telluride. (P16, Cr, Te, Se)

363-P. (English.) The Magnetic Properties of $FeSe_x$ With the NiAs Structure. Tokutaro Hirone and Shu Chiba. *Physical Society of Japan, Journal,* v. 11, No. 6, June 1956, p. 666-670.

The phase diagram investigated by means of X-ray and thermal analyses in the composition region in which ferrimagnetism is supposed to occur. (P16, Fe, Se)

364-P. (Book.) Encyclopedia of Physics. v. XIX. Electrical Conductivity. Pt. I. S. Flügge, editor. 411 p. 1956. Springer-Verlag, Berlin, Germany.

Reviews on electronic structure of solids, experimental metallic conductivity, electrical and thermal conductivity theory in metals and photoconductivity. (P15)

365-P. The Thermodynamics of the Liquid Solutions in the Triad Cu-Ag-

Au. II. The Cu-Au System. Russell K. Edwards and Merwyn B. Brodsky. *American Chemical Society, Journal*, v. 78, July 5, 1956, p. 2983-2989.

Thermodynamic values obtained from rate of effusion measurements, carried out over a number of solutions in the temperature range from 1500 to 1600° K. (P12, M24, Cu, Au)

366-P. (English.) **Studies on the Wetting Effect and the Surface Tension of Solids. The Change in Scratch Hardness of Carbon Steel and Aluminium Due to Wetting by Some Cutting Liquids.** Mizuho Sato and Kanji Miyazawa. *Japan Academy, Proceedings*, v. 32, No. 4, Apr. 1956, p. 267-269.

Experiments with "Cimcool" and "Dash" cutting oils.
(P10, Q29, G21, CN, Al)

367-P. (French.) **Electrochemical Behavior of Tungsten. Voltage pH Diagram of the W-H_2O System at 25° C.** E. Deltombe, N. de Zoubov and M. Pourbaix. *Centre Belge d'Etude de la Corrosion, Rapport Technique*, no. 32, 1956, 10 p.

Conclusions are drawn relative to the general properties of tungsten and its oxides, particularly the stability, corrosion and electrodeposition of tungsten, and the stability of tungsten oxides and tungstic solutions. (P15, L17, R1 W)

368-P. (French.) **Standard Free Enthalpies of Formation at 25° C.** *Centre Belge d'Etude de la Corrosion, Rapport Technique*, no. 28, 1955, 9 p.

Table of values of free enthalpies of formation for substances that would be considered in studying the electrochemical behavior of metals and metalloids in aqueous solutions at 25° C. (P12, P15)

369-P. (German.) **Conductivity Variation of Thin Evaporated Silver Film During Electrostatic Charge.** A. Deubner and K. Rambke. *Annalen der Physik*, v. 17, no. 6-8, 1956, p. 317-328.

Method of recording and measurement of conductivity changes due to variation in free electrons.
(P15, L25, Ag)

370-P. (German.) **Determination of Surface Tension of Pure and Alloyed Steel.** Wilhelm vor dem Esche and Oskar Peter. *Archiv für das Eisenhüttenwesen*, v. 27, no. 6, June 1956, p. 355-366.

Review of literature data, experimental measurement of surface tension of liquid iron and of phosphorus and silicon steels.
(P10, Fe, AY)

371-P. (German.) **Heat Conductivity of Glass-Like Selenium.** H. J. Orthmann and K. Ueberreiter. *Kolloid-Zeitschrift*, v. 147, no. 3, June 1956, p. 129-131.

Calculation of heat conductivity in the range from 0 to 50° C. Explanation of the heat conductivity decrease in the freezing range.
(P11, Se)

372-P. (German.) **Emission of Electrons in a Plastic Deformation of Zinc Single Crystals.** J. Lohff. *Zeitschrift für Physik*, v. 145, no. 4, 1956, p. 504-507.

Effect of mechanical finishing of sheet metal on the emission of electrons. (P15, Q24, Zn)

373-P. Liquid Metals. IV. The Wetting of Zinc by Liquid Sodium; the Significance of the Critical Wetting Temperature. C. C. Addison, W. E. Addison, D. H. Kerridge and J. Lewis. *Chemical Society, Journal*, June 1956, p. 1454-1461 + 2 plates.

Measurement of contact angles over ranges of time and temperature. Electropolished zinc surfaces show a critical wetting temperature near 160° C. (P10, Na, Zn)

374-P. A Rapid Method for Measuring Coercive Force and Other Ferromagnetic Properties of Very Small Samples. G. W. Van Oosterhout. *Applied Scientific Research*, v. 6, sec. B, no. 1-2, 1956, p. 101-104.

A method for the quantitative investigation of samples of about 1 m.g. is based essentially on the measurement of the alternating e.m.f. generated by letting the sample vibrate in a search-coil. (P16)

375-P. Heat Capacity of Dysprosium From 15 to 300° K. Maurice Griffel, R. E. Skochdopole and F. H. Spedding. *Journal of Chemical Physics*, v. 25, July 1956, p. 75-79.

The thermodynamic functions of dysprosium calculated. (P12, Dy)

376-P. Equilibria of Sulfur and Oxygen Between Liquid Iron and Open Hearth-Type Slags. H. L. Bishop, Jr., H. N. Lander, N. J. Grant, and J. Chipman. *Journal of Metals*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, July 1956, p. 862-868.

Effects of slag composition and temperature on the iron oxide activity, distribution of sulfur between slag and metal, carbon content of the metal. Includes an over-all reaction for the equilibrium between sulfur and oxygen.
(P12, B21, D2, Fe)

377-P. Hydrogen Overpotential at Electrodeposited Nickel Cathodes in Hydrochloric Acid Solutions. I. A. Ammar and S. A. Awad. *Journal of Physical Chemistry,* v. 60, July 1956, p. 837-841.

Measurements carried out in the current density range of 10^{-6} to 10^{-2} amp. per sq.cm. (P15, L17, Ni)

378-P. A Calorimetric Investigation of Some Binary and Ternary Liquid Alloys Rich in Tin. O. J. Kleppa. *Journal of Physical Chemistry,* v. 60, July 1956, p. 842-846.

Measurement on the heat of solution of indium, antimony, copper and gold in liquid tin. (P12, In, Sb, Cu, Au, Sn)

379-P. Heat of Formation of Solid and Liquid Alloys in the Systems Silver-Cadmium, Silver-Indium and Silver-Antimony at 450°. O. J. Kleppa. *Journal of Physical Chemistry,* v. 60, July 1956, p. 846-852.

The heats of formation of the solid alloys by the tin solution technique. (P12, Ag, Cd, In, Sb, Sn)

380-P. Heat of Formation of Solid and Liquid Binary Alloys of Copper With Cadmium, Indium, Tin and Antimony at 450°. O. J. Kleppa. *Journal of Physical Chemistry,* v. 60, July 1956, p. 852-858.

Data compared with earlier calorimetric work. (P12, Cu, Cd, In, Sn, Sb)

381-P. Heat of Formation of Some Solid and Liquid Binary Alloys of Gold With Cadmium, Indium, Tin and Antimony. O. J. Kleppa. *Journal of Physical Chemistry,* v. 60, July 1956, p. 858-863.

Heats of solution determined at 450° C. (P12, Au, Cd, In, Sn, Sb)

382-P. The Effect of Some Corrosion Inhibitors and Activators on the Hydrogen Overpotential at Fe Cathodes in NaOH Solutions. I. A. Ammar and S. A. Awad. *Journal of Physical Chemistry,* v. 60, July 1956, p. 871-874.

Measurements made in 0.2 *N* sodium hydroxide solutions to which organic substances were added. (P15, R10, Fe)

383-P. Surface Tension at Elevated Temperatures. III. Effect of Cr, In, Sn and Ti on Liquid Nickel Surface Tension and Interfacial Energy With Al_2O_3. C. R. Kurkjian and W. D. Kingery. *Journal of Physical Chemistry,* v. 60, July 1956, p. 961-963.

Determinations made by the sessile drop method. (P10, Cr, In, Sn, Ti, Ni)

384-P. Conversion Calculator. K. E. G. Meredith. *Metal Industry,* v. 89, July 6, 1956, p. 10-11.

To simplify the process of interconversion of weight and atomic per cent for binary systems, a simple compact calculator, with which only one setting is required, was developed. (P10)

385-P. Trapped Flux in Impure Superconductive Tin. J. I. Budnick, E. A. Lynton and B. Serin. *Physical Review,* v. 103, ser. 2, July 15, 1956, p. 286-291.

Measurements of percentage of trapped flux in cylindrical tin samples containing antimony, bismuth, or indium, with particular regard to the effect of annealing. (P15, Sn)

386-P. Radiochemical Studies of the Interaction of Lead With Protons in the Energy Range 0.6 to 3.0 Bev. R. Wolfgang, E. W. Baker, A. A. Caretto, J. B. Cumming, G. Friedlander and J. Hudis. *Physical Review,* v. 103, ser. 2, July 15, 1956, p. 394-403.

Lead targets were bombarded with protons of several energies between 0.6 and 3.0 Bev and formation cross sections determined for about 30 nuclides of A <140 produced in these bombardments. (P13, M25, Pb)

387-P. Rotational Losses in 4-79 Molybdenum Permalloy at Low Frequencies. Joseph M. Kelly. *Physical Review,* v. 103, ser. 2, July 15, 1956, p. 499-500.

Lag in rotation of magnetization when the superimposed magnetic field is rotated. (P16, SG-n, Mo)

388-P. Impurity Band Conduction in Germanium and Silicon. Esther M. Conwell. *Sylvania Technologist,* v. 9, July 1956, p. 82-84.

Electric current in a semiconductor can occur not only in the conduction and valence bond bands, but also in impurity bands. Since it seems now to be well established for Ge and Si, elementary concepts are discussed to clarify the theory. (P15, Ge, Si)

389-P. (Czech.) Growth of Cast Iron in Cast-Iron Molds Used for Casting Steel. Josef Pribyl. *Hutnik,* v. 6, no. 4, Apr. 1956, p. 106-113.

Primary growth is increase in volume due to the decomposition of carbides, especially cementite. Factors affecting this growth include structure and chemical composition of the cast iron, the relation between temperature and diffusion, casting technique and the like. (P10, N8, T5, CI, ST)

390-P. (French.) **Optical System for Easily Determining the Fusion Point.** L. Nicolas and J. Mansel. *Chimie Analytique,* v. 38, no. 7, July 1956, p. 258.

Some elaborations of the Roth apparatus to make it possible to view simultaneously the fusion of the product being tested and the temperature scale. (P12)

391-P. (German.) **Chemical Behavior of Aluminum Materials. II.** *Aluminium Ranshofen, Mitteilungen,* v. 4, no. 1, Apr. 1956, p. 3-10.

The second part of a compendium on chemical properties of various substances in interaction with aluminum. Covers nonmetallic compounds, metals and metallic compounds in the inorganic, and aliphatic and aromatic compounds in the organic field. (P13, Al)

392-P. (German.) **Effect of Additions on the Electric Conductivity of Copper. I. Electric-conductivity of Pure Copper, Its Maximum Value and the Effect of Admixtures.** Franz Pawlek and Karl Reichel. *Zeitschrift für Metallkunde,* v. 47, no. 6, June 1956, p. 347-356.

Electric conductivity and temperature coefficient measurements. A survey of the solubility in copper for 49 elements and of the atomic increase of resistance in copper for 30 elements. (P15, N12, Cu)

393-P. (German.) **The Influence of Additions on the Electric Conductivity of Copper. II. Effect of Several Metallic Inclusions and of Oxygen on the Electric Conductivity of Copper.** Franz Pawlek, Klaus Viessmann and Helmut Wendt. *Zeitschrift für Metallkunde,* v. 47, no. 6, June 1956, p. 357-363.

Simultaneous metallic additions have a cumulative effect on the electric resistance as long as their amounts keep within limits.

394-P. (Polish.) **Thermodynamic Properties of Some Metal Alloys.** Andrzej Block-Bolten. *Archiwum Hutnictwa,* v. 1, no. 1, 1956, p. 11-51.

Relations are given for activity coefficients, partial molal heat of solution, heat of formation and partial and total pressures of vapor over solutions. (P12)

395-P. (Polish.) **Coefficients of Activity of Nonferrous Metals Giving Eutectics.** Wladyslaw Ptak. *Archiwum Hutnictwa,* v. 1, no. 1, 1956, p. 53-97.

Data includes dependence of activity coefficients on composition, dependence of molecular heats of dissolution on composition and whole heats required to obtain a solution. (P12)

396-P. The Change of Thermal Electromotive Force of Metals Due to Plastic Deformation. N. F. Kunin. *Fizika Metallov i Metallovedenie,* v. 2, no. 2, 1956, p. 237-243.

Relation between the plastic deformation characteristics and the induced thermo-electromotive force. Induction of thermo-electromotive force in various kinds of plastic deformation. Induced thermo-electromotive force versus absorbed energy. (P15, Q24)

397-P. (Russian.) **Thermal Expansion of Silicon and Its Iron Alloys.** P. V. Gel'd, N. N. Serebrennikov and P. M. Sokharev. *Fizika Metallov i Metallovedenie,* v. 2, no. 2, 1956, p. 244-253.

A study of heat expansion curves of iron-silicon alloys within the 100-1000° C. temperature range. Offers empirical formulas for the temperature dependence of linear expansion coefficients of silicon and of some of its iron alloys. (P11, Si, Fe)

398-P. (Russian.) **The Influence of the Cooling Rate in Thermomagnetic Treatment on the Magnetic Properties of Cold-Rolled Transformer Steel.** D. D. Mishin and M. M. Belenkova. *Fizika Metallov i Metallovedenie,* v. 2, no. 2, 1956, p. 370-374.

Determines the dependence of changes in the magnetization curve, magnetostriction and coercive force on the cooling rate. The lower the rate, the stronger its effect. The effect of the thermomagnetic treatment is anisotropic. (P16, SG-p, ST)

399-P. (Russian.) **On the Solubility of Oxygen in Liquid Nickel and Iron-Nickel Alloys.** A. M. Samarin and V. P. Fedotov. *Izvestiia Akademii nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* no. 6, June 1956, p. 119-125.

Mechanism of solution. Comparison of experimental data with certain literary data. Solution of oxygen in liquid nickel is accompanied by a penetration of nickel oxide into the metal. (P13, N16, Ni, Fe)

400-P. The Enthalpy of a 0.12% Carbon Steel. J. R. Pattison and T. H. Lonsdale. *Iron and Steel Institute, Journal,* v. 183, July 1956, p. 284-286.

From enthalpy data obtained by water calorimetry, values were assigned to the heats of transformation at the γ to $\delta + \gamma$ phase change temperature (1467° C.), the peritectic temperature (1481° C.), and the liquidus temperature (1509° C.). (P12, CN)

401-P. On the Mechanism of Irradiation Annealing. R. S. Barnes and M. J. Makin. *Journal of Nuclear Energy*, v. 2, June 1956, p. 291-298.

The observed irradiation annealing of copper can be satisfactorily accounted for if an interstitial atom can eventually migrate with little loss of energy through the crystal lattice. (P15, J23, Cu)

402-P. (French.) **Radiation Damage in Metals.** Robert Scimar. *Revue Universelle des Mines*, v. 12, ser. 9, no. 7, July 1956, p. 185-199.

Various types of radiations and their possible effects on electrical, mechanical, crystallographic and physical properties.
(P general, Q general, M26)

403-P. The Determination of Thermal Diffusivity of Aluminum Alloys at Various Temperatures by Means of a Moving Heat Source. Daniel Rosenthal and N. E. Friedmann. *ASME Transactions*, v. 78, Aug. 1956, p. 1175-1180.

Results on alloys 35 and 61S proved that values of thermal diffusivity, averaged over an interval of 100° F., can be determined easily to three significant figures.
(P11, Al)

404-P. (English.) **Physico-Chemical Researches on Copper Metallurgy. IV. Activity of Sulphur in Molten Copper.** Keinosuke Hirakoso and Tokiaki Tanaka. *Hokkaido University, Faculty of Engineering, Memoirs*, v. 9, Nov. 1954, p. 565-573.

Equilibrium for the system containing hydrogen, copper-saturated molten cuprous sulfide, and sulphur-saturated liquid copper was determined from 1145 to 1247° C. by the flow method. (P12, C21, Cu)

405-P. The Dissociation Pressures in the Zirconium-Oxygen System at 1000° C. O. Kubaschewski and W. A. Dench. *Institute of Metals, Journal*, v. 84, July 1956, p. 440-444.

Alloys of various compositions were equilibrated with calcium, magnesium or barium in bombs of zirconium or steel at 1000° C. After leaching, the compositions of the products were determined by chemical and vacuum-fusion analyses.
(P12, S11, Zr)

406-P. The Enthalpy of Pure Iron. J. R. Pattison and P. W. Willows. *Iron and Steel Institute, Journal*, v. 183, Aug. 1956, p. 390-403.

An apparatus for the direct measurement of the enthalpy of metals at high temperatures by the method of mixtures using a water calorimeter. Some smoothed values of enthalpy for the temperature range of 1000 to 1650° C. (P12, Fe)

407-P. Thermal Changes in Steels as Shown by Resistivity. G. Bullock. *Iron and Steel Institute, Journal*, v. 183, Aug. 1956, p. 362-367.

The development of a method for determining precise apparent electrical resistivity values at high temperatures so that the results may be plotted in a manner analogous to inverse-rate thetrmal curves.
(P11, P15, ST)

408-P. Saturation Moments and d-Band Configurations in Iron and Its Alloys. B. R. Coles and W. R. Bitler. *Philosophical Magazine*, v. 1, 8th ser., no. 5, May 1956, p. 477-486.

The saturation moments of some iron-cobalt-aluminum alloys were measured and the effect of aluminum on the moments of iron-cobalt alloys compared with its effect on the moment of pure iron. (P16, Fe)

409-P. Magnetization Curves and Domain Structure. L. F. Bates and A. Hart. *Physical Society, Proceedings*, v. 69, no. 437 B, May 1956, p. 497-505.

A study of the changes in domain patterns on the two main faces of a Néel-cut crystal of silicon iron, occurring when the crystal dimensions are changed. (P16, Fe)

410-P. Chemical and Radiochemical Studies of Tellurium in Fluoride Volatility Processes. J. Fischer and R. K. Steunenberg. *Argonne National Laboratory (U. S. Atomic Energy Commission)*, ANL-5593, June 1956, 19 p.

The chemical nature of various gas and liquid phase mixtures of tellurium hexafluoride with bromine trifluoride, bromine pentafluoride and bromine. Radiochemical observations on the partial reduction of tellurium hexafluoride and the separation of daughter isomers due to the internal conversion of gamma rays of Te^{127m} and Te^{129m}. (P13, Te)

411-P. Some Thermal Properties of Solid Materials. I. Metals. M. E. Lapides and R. C. Brubaker. *General Electric Company, Aircraft Nuclear Propulsion Department (U. S. Atomic Energy Commission)*, APEX-244, Sept. 1955, 65 p.

A review of the theoretical background of some thermal properties. Data for thermal conductivity, specific heat, density, emissivity, melting points and thermal expansion coefficients of nine metals.
(P10, P11, P12, P17)

412-P. Solid-Liquid Equilibrium in the Lithium-Lithium Hydride System. I. Apparatus; Melting and Freezing Points of Lithium Hydride and Lithium Hydride-Rich Mixtures. Charles E. Messer, Edwin B. Damon and P. C. Maybury. *Tufts University, (U. S. Atomic Energy Commission),* NYO-3958, Dec. 1955, 16 p.

A thermal analysis under conditions of carefully controlled heating and cooling rates. Hydrogen pressures and changes in composition by hydrogen gain or loss were studied. (P12, Li)

413-P. Solubility of Hydrogen in Liquid Aluminum, Lead, and Zinc. W. Hofmann and J. Maatsch. *Henry Brutcher, Translation No* 3752, 15 p. (From *Zeitschrift Metallkunde.* v. 47, no. 2, 1956, p. 89-94.) Henry Brutcher, Altadena, Calif.

Procedure and apparatus for solubility measurements, purification of gas, constancy of temperature, measurement of pressure and volume. (P13, Al, Pb, Zn)

414-P. (Russian.) **Thermo-Electrical Properties of Cr Sb_2.** N. Kh. Abrikosov and V. F. Bankina. *Doklady Akademii Nauk SSSR,* v. 108, no. 4, June 1, 1956, p. 627-628.

Experimental results are given in tables and graphs. (P15, Cr, Sb)

415-P. (Russian.) **Thermo-Electric Properties of Bismuth.** G. A. Ivanov and L. I. Mokieveskii. *Zhurnal Tekhnicheskoi Fiziki,* v. 26, no. 6, June 1956, p. 1343-1344.

Correction of previous statements as to relation between thermo-electromotive force and temperature differences at specimen ends. (P15, Bi)

416-P. The Equilibrium of α-Silver-Cadmium Alloys With Cadmium Vapor. George Scatchard and Richard. H. Boyd. *American Chemical Society, Journal,* v. 78, Aug. 20, 1956, p. 3889-3893.

An electronic spectrophotometer for measuring the concentration of metal vapor in equilibrium with a solid or liquid alloy. A comparison of the behavior of three α-alloys: copper-zinc, silver-zinc, silver-cadmium. (P12, Ag, Cu, Cd, Zn)

417-P. Activity Coefficient of Copper in Liquid Iron at 1600° C. Frederick C. Langenberg. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, sec. 2, Aug. 1956, p. 1024-1025.

Experimental determination. (P12, Cu, Fe)

418-P. Vapor Pressure of Liquid Copper and Activities in Liquid Fe-Cu Alloys. J. P. Morris and Glenn R. Zellars. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, sec. 1, Aug. 1956, p. 1086-1090.

Carrier gas method was used to measure the vapor pressure of copper over liquid copper and Fe-Cu alloys. (P12, Fe, Cu)

419-P. Predicting the Solubility of Nitrogen in Molten Steel. Frederick C. Langenberg. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, sec. 1, Aug. 1956, p. 1099-1101.

A method is presented for computing the solubility of nitrogen in molten alloy steels. Examples are given to illustrate the procedure; comparisons are made between predicted and measured nitrogen solubilities. (P13, N12, AY)

420-P. Activity Coefficient of Copper in Liquid Iron, Fe-C, and Fe-C-Si Alloys at 1600° C. Peter J. Koros and John Chipman. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, sec. 1, Aug. 1956, p. 1102-1104.

Distribution of copper between liquid silver and liquid iron, Fe-C, and Fe-C-Si alloys was studied at 1600° C. (P12, Cu, Fe)

421-P. The Evolution of the Energy Stored by a Gold-Silver Alloy Cold Worked at −195° C. and at Room Temperature. Peter Greenfield and M. B. Bever. *Massachusetts Institute of Technology (U. S. Atomic Energy Commission),* AECU-3124, 1955, 17 p.

Energy stored was measured by tin solution calorimetry. Effect of annealing upon the energy content retained by samples deformed at these temperatures; results discussed in terms of the types of lattice imperfections produced by cold working. (P12, Ag, Au)

422-P. Magnetic Measurements. C. E. Webb. *Metallurgia,* v. 54, no. 322, Aug. 1956, p. 57-66.

Basic principles of the chief methods of determining the properties of ferromagnetic materials. Special consideration is given to the testing of permanent magnets by standard and comparative methods, and to the conditions necessary to insure that test results give reliable indications of practical performance. (P16)

423-P. Magnetic Properties of Steels. R. V. Tamhankar. *Tisco,* v. 3, July 1956, p. 95-103.

Magnetic phenomenon and the domain theory, soft, hard, and nonmagnetic steels; magnetic analysis;

applications in nondestructive testing. (P16, S13, ST)

424-P. (English.) **Pictorial Kinetic Methods in the Theory of Metals and Semiconductors.** R. B. Dingle. *Physica,* v. 22, no. 8, Aug. 1956, p. 671-680.

This pictorial method gives correct results when the collision time is independent of the electron speed. (P15)

425-P. (French.) **Magnetic, Antiferromagnetic and Ferromagnetic Properties of $MnAu_2$.** André J. P. Meyer and Pierre Taglang. *Journal de Physique et le Radium,* v. 17, no. 6, June 1956, p. 457-465.

$MnAu_2$ is antiferromagnetic in fields below 10,000 oersteds below 90° C., ferromagnetic when the field increases above a certain threshold, and paramagnetic above 90° C. A recent theory by L. Neel correctly interprets the experimental facts. (P16, Au, Mn)

426-P. (German.) **Effect of Electromagnetic Irradiation and Corpuscular Radiation on the Properties of Solid Bodies.** Paul Höller. *Archiv für das Eisenhüttenwesen,* v. 27, no. 7, July 1956, p. 459-468.

Review of literature on the subject, with particular reference to metals. (P general)

427-P. (German.) **Shrinkage Behavior of Cast Iron.** A. Wittmoser, H. A. Krall and L. Hütter. *Giesserei,* v. 43, no. 16, Aug. 2, 1956, p. 409-418.

Study of tendency of various cast irons to form pipe cavities and other shrinkage defects. (P10, E25, CI)

428-P. (Italian.) **Thermodynamic Researches on Metallic Systems. VIII. The Ternary Liquid System Zn-Cd-Sb.** Mario Fiorani, Venanzio Valenti and Luigi Oleari. *Gazzetta Chimica Italiana,* v. 86, nos. 8-9, Aug.-Sept. 1956, p. 624-630.

Integral molar thermodynamic values of the Zn-Cd-Sb system in liquid state. (P12, Zn, Cd, Sb)

429-P. Magnetizing and Demagnetizing Permanent Magnets. R. J. Parker. *Electrical Manufacturing,* v, 58, Sept. 1956, p. 116-123.

The mechanics of magnetization have a decided design influence. Some practical techniques are presented. (P16, SG-n)

430-P. The Cohesive Energies of Transition Metals. J. Stanley Griffith. *Journal of Inorganic and Nuclear Chemistry,* v. 3, Aug. 1956, p. 15-23.

An approximate theory of cohesive energies of first transition-series metals. (P12, Q23)

431-P. Density Changes During the Annealing of Deformed Nickel. L. M. Clarebrough, M. E. Hargreaves and G. W. West. *Philosophical Magazine,* v. 1, 8th ser., no. 6, June 1956, p. 528-536.

Changes were measured by a differential method and are correlated with earlier measurements of stored energy, electrical resistivity and hardness. (P10, J23, Ni)

432-P. Some Properties of the Coercive Force in Soft Magnetic Materials. D. S. Rodbell and C. P. Bean. *Physical Review,* v. 103, ser. 2, Aug. 15, 1956, p. 886-895.

Coercive force was measured in specimens of magnetically annealed 65 Permalloy tapes and a 3.25% SiFe picture frame single crystal for both low and high-field domain configurations. (P16, Ni, Fe)

433-P. (German.) **Thermodynamic Analysis. IV. Mixing Entropy and Formation Activity of Lead-Cadmium Smelting From Calorimetric Measurements.** Willy Oelsen, Eberhard Schürmann, Hans-Joachim Weigs and Olaf Oelsen. *Archiv für das Eisenhüttenwesen,* v. 27, no. 8, Aug. 1956, p. 487-511.

Determination of mixing heat, activity and entropy of lead-cadmium alloy formation from continuously recorded heat absorption curves. (P12, Pb, Cd)

434-P. (German.) **Functional Relationship of Temperature of Molar Volumes of the Phases NaTl and LiCd.** A. Schneider and G. Heymer. *Zeitschrift für Anorganische und Allgemeine Chemie,* v. 286, no. 3-4, July 1956, p. 118-135.

Radiographic determination of lattice constants between room temperature and melting point is applied to lead, antimony, thallium, cadmium and indium. Results are compared with the temperature dependence of densities of NaTl and LiCd in solid and liquid states. Various factors determining the stability of the NaTl lattice are presented. (P10, M26, Na, Li, Pb, Sb, Tl, Cd, Zn)

435-P. (Book) **Metal Physics and Physical Metallurgy. v. III. Thermochemical Data of Alloys.** O. Kubaschewski and J. A. Catterall. 200 p. 1956. Pergamon Press, 122 E. 55th St., New York, N. Y.

The partial and integral heats, entropies, and free energies were assessed for about 230 binary and ternary systems. (P12)

436-P. Thermal and Electrical Conductivities of Iron, Nickel, Titanium,

and Zirconium At Low Temperatures. W. R. G. Kemp, P. G. Klemens and G. K. White. *Australian Journal of Physics,* v. 9, June 1956, p. 180-188.

Measurements indicate that thermal conduction in pure iron and nickel is almost completely electronic. Titanium and zirconium exhibit an appreciable lattice component of thermal conduction. (P11, P15, Zr, Ti, Ni, Fe)

437-P. (English.) **The Surface Tensions of Liquid-Metal Solutions.** J. W. Taylor. *Acta Metallurgica,* v. 4, no. 5, Sept. 1956, p. 460-468.

Two analytical methods are presented for the calculation of the surface tensions of binary liquid-alloy mixtures. Calculated surface tension composition relationships are compared with the corresponding experimental values for 10 binary systems. (P10)

438-P. (English.) **Change of Magnetic Susceptibility of Transition Metals and Alloys at Their Melting Points.** Yasuaki Nakagawa. *Physical Society of Japan, Journal,* v. 11, no. 8, Aug. 1956, p. 855-863.

The magnetic susceptibility of manganese, iron, cobalt, nickel and their alloys was measured up to 1600° C. (P16, Ni, Mn, Fe, Co)

439-P. (French.) **Magnetic Properties of Metallic Europium.** Charlotte Henry La Blanchetais and Félix Trombe. *Comptes Rendus,* v. 243, no. 8, Aug. 20, 1956, p. 707-709.

Thermomagnetic study of europium samples in a partly or completely fused state, starting from cadmium-europium alloys. Ferromagnetism with Curie point apparently near 90° K. Paramagnetism at 108° K. (P16, Eu, Cd)

440-P. (German.) **New Method to Determine the Molding Properties and the Viscosity of Metal Melts.** H. Kessler and K. Detering. *Aluminium,* v. 32, no. 9, Sept. 1956, p. 536-540.

New apparatus which permits measurement of the filling time of a hollow vessel which extends under the level of the melt and has, at its lowest point, an intake valve which can be closed. Laboratory applications of the device. (P10, E23, Al)

441-P. (German.) **The Influence of Defective Lattice Construction on the Magnetic Susceptibility of Germanium.** *Helvetica Physica Acta,* v. 29, no. 3, June 1956, p. 188-189.

Various tempering methods are applied to germanium, pure or doped with indium and antimony. It is not affected by dislocations when alloyed with copper or gold. Hysteresis is eliminated by surface treatments. (P16, M26, Ge, Au, Cu)

442-P. (German.) **The Variations of Resistance of Metals in High Magnetic Fields.** B. Lüthi. *Helvetica Physica Acta,* v. 29, no. 3, June 1956, p. 217-219.

Copper, aluminum and tin specimens were tested at liquid helium temperature in fields of 20 to 200° K-Gauss. Resistance increases with increase in field strength. (P15, P16, Sn, Al, Cu)

443-P. (German.) **Significance of the Temperature Course of Permeability (Mn_2Sb, Cobalt, Iron, Nickel).** Martin Kersten. *Zeitschrift für Angewandte Physik,* v. 8, no. 8, Aug. 1956, p. 382-386.

Comparison of theoretical temperature course with experimental data in connection with the process of vaulting of the Bloch walls. (P16, Mn, Sb, Co, Fe, Ni)

444-P. (Russian.) **The Relationship Between the Constants of Magnetic Anisotropy of Cubic Crystals and the Temperature and Field Strength.** S. V. Tiablikov and A. A. Gusev. *Fizika Metallov i Metallovedenie,* v. 2, no. 3, 1956, p. 385-390.

Theoretical mathematical treatment of the problem. (P16)

445-P. (Russian.) **Regression of Induced Thermo-Electromotive Force in Copper.** N. F. Kunin and M. A. Iakovlev. *Fizika Metallov i Metallovedenie,* v. 2, no. 3, 1956, p. 418-422.

A study of the kinetics of release of the induced thermo-electromotive force during annealing of deformed copper. Experimental data for various degress of deformation as well as annealing temperatures are discussed. (P15, J23, Q24, Cu)

446-P. (Russian.) **Variations in Thermo-Electromotive Force of Metals in the Copper Subgroup Subjected to Plastic Deformation at Various Temperatures.** N. F. Kunin and I. Z. Melamed. *Fizika Metallov i Metallovedenie,* v. 2, no. 3, 1956, p. 423-427.

An attempt to verify the applicability of the relationship known between the change in thermo-electromotive force and the relative deformation in copper to other metals of the same subgroup of the periodic table. The force-deformation function proves to be additive. (P15, Q24, Cu, Ag, Au)

447-P. (Russian.) **An Instrument for Measuring Surface Tension and Density of Liquid Metals in a Vacuum.**

N. L. Pokrovskii and M. Saidov. *Fizika Metallov i Metallovedenie,* v. 2, no. 3, 1956, p. 546-551.

Glass device for measuring surface tension and density of liquid metals in a vacuum at temperatures not exceeding 550° C. Measurements of surface tension and density of tin with the device. (P10, Sn)

448-P. (Russian.) **The Composition-Heat Resistance Diagram of Alloys of the Ternary Nickel-Chromium-Titanium System.** I. I. Kornilov and L. I. Priakhina. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* no. 7, July 1956, p. 103-110 + 2 plates.

A study of heat resistance as a function of microstructure, hardness, electric resistance and composition. (P12, M27, Q29, P15, Ni, Cr, Ti)

449-P. (Russian.) **Certain Changes Characteristic of Galvanomagnetic Properties in Relation to the Composition of Alloys.** N. V. Grum-Grzhimailo. *Zhurnal Neorganicheskoi Khimii,* v. 1, no. 6, 1956, p. 1361-1367.

Goldhammer effect in alloys of ferromagnetic nickel-cobalt in annealed condition. Goldhammer effect in iron-nickel alloys. (P16, Fe, Ni, Co)

450-P. Hydrogen Overpotential at Electrodeposited Copper in Hydrochloric Acid. S. E. El Wakkad, I. A. Ammar and H. Sabry. *Chemical Society, Journal,* 1956, Aug. 1956, p. 3020-3024.

Hydrogen overpotential is measured on copper cathodes, deposited from a cyanide bath on a platinum substrate, in N-hydrochloric acid, at 30° C. (P15, L17, Cu)

451-P. Changes in the Properties of Uranium During Burn-Up. S. F. Pugh. *Institute of Metals, Journal,* v. 84; *Institute of Metals, Bulletin,* v. 3, Aug. 1956, p. 105-108.

Contains interesting examples of the types of damage that can occur. (P10, Q23, U)

452-P. The Effect of Oil Quenching and Tempering on the Thermal Conductivities and Electrical Resistivities of Three Steels. R. W. Powell and and R. P. Tye. *Iron and Steel Institute, Journal,* v. 184, Sept. 1956, p. 10-17.

Tempering increases the conductivity, and for each steel a maximum conductivity is obtained after tempering at an optimum temperature of about 100° C. below the transformation temperature. (P11, P15, J26, J29, ST)

453-P. The Effect of Quenching on the Thermal Conductivities and Electrical Resistivities of Steel. R. W. Powell. *Iron and Steel Institute, Journal,* v. 184, Sept. 1956, p. 6-10.

Study of effect of water-quenching on room-temperature electrical resistivities of steels previously investigated in the annealed or stabilized states shows increases of 30% or more in about half of the steels. (P11, P15, J26, ST)

454-P. Effect of Magnetic Field Strength During Condensation on the Coercivity and Form of Vapor-Deposited Iron. A. J. Griest, J. F. Libsch and G. P. Conrad. *Journal of Applied Physics,* v. 27, Sept. 1956, p. 1022-1024.

The size, shape and coercivity of iron particles deposited from vapor on a copper surface were influenced by the temperature of the condensation and the strength of a magnetic field applied during deposition. (P16, L25, M27, Fe)

455-P. Effect of Pressure on Superconducting Transitions and on Electrical Resistance at Low Temperatures. J. Hatton, *Physical Review,* v. 103, ser. 2, Sept. 1, 1956, p. 1167-1172.

Measurements made on the shift of the superconducting transition temperatures of tin, indium, mercury, thallium, and tantalum by pressures up to 5000 kg. per sq.cm. show a resistance decrease under pressure. (P15, Sn, In, Hg, Tl, Ta)

456-P. Elastogalvanomagnetic Effect and Intervalley Scattering in *n*-Type Germanium. Robert W. Keyes. *Physical Review,* v. 103, ser. 2, Sept. 1, 1956, p. 1240-1245.

Conclusions are drawn from a calculation of the effect of elastic strain on certain galvanomagnetic effects. (P16, P15, Ge)

457-P. Size Changes of Steel Rings During Heat Treatment. C. P. McShane and R. W. Bratt. *Tool Engineer,* v. 37, Oct. 1956, p. 81-84.

Size changes vary according to the type of steel, tempering temperatures and other factors. (P10, J26, J29, TS)

458-P. (English.) **Law of the Approach to Magnetic Saturation.** Takasi Huzimura. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 8, no. 2, Apr. 1956, p. 71-78.

Concludes that the isotropic internal stress in the classical theory of magnetization process should be replaced by that of the dislocation model. (P16)

459-P. (English.) **Magnetic After-Effect. I.** Takasi Huzimura. *Science Reports on the Research Institutes, Tohoku University,* ser. A, v. 8, no. 2, Apr. 1956, p. 87-94.

Studies from the standpoint of the activation process; fundamental equations were obtained. (P16)

460-P. (English.) **The Density, Magnetic Properties, Young's Modulus, and ΔE-Effect, and Their Changes Due to Quenching in Ferromagnetic Iron-Aluminium Alloys. I. The Density and Magnetic Properties.** Mikio Yamamoto and Satoshi Taniguchi. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 8, no. 2, Apr. 1956, p. 112-124.

Density and ferromagnetic properties in annealed and in quenched states of iron-aluminum alloys containing less than 17% aluminum were measured. Shows that the magnetocrystalline anisotropy constant of iron decreases with the addition of aluminum and changes its sign near the Fe_3Al composition. (P10, P16, Fe, Al)

461-P. (English.) **The Influence of Heat Treatment on the Magnetic Properties of Face-Centered Cubic Nickel-Cobalt Alloys.** Mikio Yamamoto and Satoshi Taniguchi. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 8, no. 4, Aug. 1956, p. 280–292.

Anomalous magnetic behavior in the annealed state, changes in magnetic properties due to quenching and magnetic annealing, and magnetic behavior of these alloys at high temperatures is explained in terms of the idea of the stabilization of domain walls by the induced uniaxial anisotropy. (P16, J26, Ni, Co)

462-P. (English.) **Ferromagnetic Domain Patterns on Nickel Crystals. II. Domain Patterns on General Surfaces of Unmagnetized Crystals.** Takao Iwata and Mikio Yamamoto. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 8, no. 4, Aug. 1956, p. 293-312.

The complicated domain patterns observed on general crystal surfaces were interpreted. (P16, Ni)

463-P. (English.) **Magnetic After-Effect. II.** Takasi Huzimura. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 8, no. 4, Aug. 1956, p. 313-318.

Assumes that the after-effect is an exhaustion phenomenon, and discusses it in terms of retardation of irreversible magnetic wall displacement. (P16)

464-P. (English.) **Magnetic Properties of Maguet Alloys of Iron, Wolfram and Molybdenum.** Hakaru Masumoto and Yuki Shirakawa. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 8, no. 4, Aug. 1956, p. 319-324.

Residual induction and the coercive forces were measured after various heat treatments. (P16, J general, Fe, W, Mo)

465-P. (English.) **On the Activities of Cr and C in Molten Fe-C-Cr Alloys.** Masayasu Ohtani. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 8, no. 4, Aug. 1956, p. 337-351.

The electromotive force corresponding to the change in chromium and carbon in iron-carbon-chromium alloys at about 1540° C. was measured by an electrode concentration cell. (P12, Cr, Fe)

466-P. (Russian.) **Measuring Magnetic Characteristics of Transformer Steel According to the New Standard.** V. V. Druzhinin. *Zavodskaia Laboratoriia,* v. 22, no. 8, Aug. 1956, p. 949-953.

Details of the differences between the new government specifications (GOST 802-54) and the old (GOST 802-41). Indicates new magnetic characteristics must be measured, and what the figures must be. (P16, S22, SG-p)

467-P. Ultrasonic Attenuation at Low Temperatures for Metals in the Normal and Superconducting States. W. P. Mason and H. E. Bömmel. *Accoustical Society of America, Journal,* v. 28, Sept. 1956, p. 930-943.

Early measurements for impure metals, theory of electron damping effect, high-frequency measurements in pure tin, velocity changes in superconducting region. (P10, P15, Sn)

468-P. Contribution to the Calorimetric and Metallographic Study of Work Hardening Energy Caused by Cutting a Workpiece. F. Eugene. *Microtecnic (English Ed.),* v. 10, no. 3, 1956, p. 114-119; disc., p. 119.

Studies of the distribution of heat generated in tool and workpiece during chip forming operation. Four grades of steel were used with different conditions of feed, cutting speed and front rake. (P12, G17, ST)

469-P. (English.) **Electrical Properties of Bi_2Te_2.** Shigenobu Shigetomi and Sigeyasu Mori. *Physical Society of Japan, Journal,* v. 11, no. 9, Sept. 1956, p. 915-919.

Conductivity, Hall coefficient and thermo-electric power were measured over the temperature range from 100

to 750° K. Specimens show electrical conduction of *p*-type at room temperature, hole mobility temperature dependence is represented by a formula. (P15, Te, Bi)

470-P. (Russian.) **Melting Temperature of Zinc, Cadmium, Thallium, and Antimony at Pressures up to 30,000 Kg. per Sq. Cm^2.** V. P. Butuzov, E. G. Poniatovskii and G. P. Shakhovskoi. *Doklady Akademii Nauk SSSR,* v. 109, no. 3, July 21, 1956, p. 519-520.

Apparatus and method which permits broadening the range of temperatures that can be studied under ultra-high-pressure conditions. (P12, Cd, Zn, Sb, Tl)

471-P. (Russian.) **Liberation of Zinc and Hydrogen From Acid Electrolytes on Nickel and Cobalt Electrodes.** D. P. Zosimovich and N. E. Nechaeva. *Doklady Akademii Nauk SSSR,* v. 109, no. 3, July 1956, p. 569-572.

The physical-chemical properties of surface alloys being formed and the magnitude of the hydrogen overvoltage on them determine the character of the polarization curve and its maximum. (P15, Zn, Ni, Co)

472-P. (Russian.) **Effect of Adsorbed Hydrogen on the Null-Charge Potential of Certain Metals.** V. L. Kheifets and B. S. Krasikov. *Doklady Akademii Nauk SSSR,* v. 109, no. 3, July 21, 1956, p. 586-588.

Relation of null-charge potential of several metals to solution pH. (P15)

473-P. (Russian.) **On the Theory of Galvanomagnetic Phenomena in Metals.** I. M. Lifshitz, M. Ia. Azbel and M. I. Kaganov. *Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki,* v. 31, no. 1, July 1956, p. 63-79.

Proposes a theory for strong magnetic fields. (P16, P15)

474-P. Conversion From Weight Per Cent to Atomic Per Cent in Binary Alloys. F. Forscher and W. Deboskey. *Metal Progress,* v. 70, Oct. 1956, p. 96B.

Only calculation required is computation of ratio between atomic weights of the elements. Chart may also be used if the atomic per centages are known and weight percentages are wanted. (P10)

475-P. Superconducting Transition in Aluminum. J. F. Cochran, D. E. Mapother and R. E. Mould. *Physical Review,* v. 103, ser. 2, Sept. 15, 1956, p. 1657-1669.

Behavior of an accurately ellipsoidal single crystal of pure aluminum studied by using high-precision ballistic induction method which is suited for studying the reversibility of transition. (P15, N11, Al)

476-P. Electron Characteristic Energy Losses in Metals and Compounds. Lewis B. Leder. *Physical Review,* v. 103, ser. 2, Sept. 15, 1956, p. 1721-1726.

Losses were measured with an improved technique designed to give more reliable intensity relationships. Compound spectra show a decided similarity to the spectra of parent metal. (P15, Al, Sb, Ca, Pb, Na, Te)

477-P. (English.) **The Effect of the Induced Uniaxial Anisotropy on the Domain Wall Displacements and Magnetic Behavior of Ferromagnetic Cubic Solid Solutions.** Satoshi Taniguchi. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 8, no. 3, June 1956, p. 173-192.

Uni-axial anisotropy is induced along magnetization vectors oriented in compliance with the domain distribution present during the heat treatment. (P16)

478-P. (English.) **Electrical Resistivity and Hall Effect of Noble Metals at Very Low Temperatures.** Tadao Fukuroi and Toshio Ikeda. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 8, no. 3, June 1956, p. 205-212.

Studies of gold, silver and copper. Gold showed the minimum in the resistance-temperature curve at about 6° K., below which the Hall effect was found to be temperature-dependent. (P15, Au, Ag, Cu)

479-P. (English.) **Specific Heat of Tellurium and Selenium at Very Low Temperatures.** Tadao Fukuroi and Yoshio Muto. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 8, no. 3, June 1956, p. 213-222.

Measurements in the range of liquid helium temperatures with a calorimeter of Nernst-Eucken's type. Discussions of the specific heat of these metals at low temperatures from the viewpoint of the anisotropy of the chain-like crystal lattice. (P12, M26, Te, Se)

480-P. (French.) **Austenitic-Ferritic Stainless Steels.** Joseph Hochmann. Paper from "XXVIII Congreso Internacional de Quimica Industrial", v. I. Saez, p. 558-562.

Magnetism of steels in relation to resistance to intergranular corrosion, structural hardening and resistance to general corrosion. (P16, R2, SS)

481-P. (German.) **The Structure Enthalpy of the System Copper-Selenium.** G. Gattow and A. Schneider. *Zeit-*

schrift für Anorganische und Allgemeine Chemie, v. 286, no. 5-6, Sept. 1956, p. 296-306.

Determination of structural enthalpy of alpha and beta Cu_2Se, Cu_3Se_2, CuSe and $CuSe_2$.
(P12, Cu, Se)

482-P. (Russian.) **X-Ray Investigation of Compounds in Systems Bi-Rh and Bi-Pd in Connection With a Study of Superconductivity.** N. N. Zhuravlev and G. S. Zhdanov. *Izvestiia Akademii Nauk SSSR, Seriia Fizicheskaia,* v. 20, no. 6, June 1956, p. 708-713.

Relation between crystal structure and superconductivity and between polymorphic transformations of binary compounds and change of transition temperature for going into superconductive state.
(P15, M26, Bi, Pd, Rh)

483-P. (Spanish.) **A Contribution to the Spectral Study of the Metallic State of RR-59 Light Alloy.** A. Camunas and Carmen Lago. Paper from "XXVIII Congreso Internacional de Quimica Industrial". v. I. Saez, p. 581-586.

Spectral techniques were used to study the spark effect in order to obtain the constant values of ΔS. Values were obtained for each alloying element. These values corresponded to various states of alloy produced by specific thermal treatment. The possibility of studying spectrographically the physicochemical aging of the RR-59 alloy is discussed.
(P12, N7, Si, Ni, Mg, Mn, Cu, Fe)

484-P. (Swedish.) **Material Problems Involved in Radiochemical Methods.** Roland Kiessling. *IVA Tidskrift för Teknisk-Vetenskaplig Forskning,* v. 27, no. 5, 1956, p. 196-202.

Effects of irradiation on strength, thermal and electrical conductivity, external dimensions of fissionable and nonfissionable metals.
(P general)

485-P. The Dynamic Magnetostriction of Nickel-Cobalt Alloys. C. A. Clark. *British Journal of Applied Physics,* v. 7, Oct. 1956, p. 355-360.

Measurements, at various polarizing fields, of the electromechanical coupling coefficient, reversible permeability and Young's modulus. Criteria governing the choice of magnetic materials for ultrasonic transducers. (P16, Ni, Co)

486-P. Plasma Oscillations and the Electron Theory of Metals. S. Raimes. *Research,* v. 9, Oct. 1956, p. 374-380.

Electronic interactions affecting properties of metals. Calculations based upon the application of plasma theory to an electron gas. Analogy suggests the existence of oscillations in metals. (P15)

487-P. (English.) **On the Magnetic Properties of the System MnSb-CrSb.** Tokutaro Hirone, Seijiro Maeda, Ichiro Tsubokawa and Noboru Tsuya. *Physical Society of Japan, Journal,* v. 11, no. 10, Oct. 1956, p. 1083-1087.

The change of magnetic properties due to the replacement of manganese by chromium in manganese antimonide was investigated.
(P16, Cr, Mn, Sb)

488-P. (French.) **Grain Structure and Electrical Conductivity of Aluminum and Its Alloys.** E. Nachtigall. *Revue de Métallurgie,* v. 53, no. 9, Sept. 1956, p. 660-664.

Conductivity is governed by the chemical composition, grain structure and the degree of cold working.
(P15, Al)

489-P. (Russian.) **Determination of Iron in Bimetallic Copper-Steel Bars and Rods by the Thermo-Electric Method.** P. D. Korzh. *Zavodskaia Laboratoriia,* v. 22, no. 9, Sept. 1956, p. 1076-1078.

Thermo-electric determination of iron contamination in the copper in bimetallic copper-steel bars. A dependence of the thermo-electromotive force on temperature and concentration of iron in the alloy is established. (P15, Fe, Cu)

490-P. (Russian.) **Effect of Heat Conductivity on Electrical Erosion of Metals.** A. S. Zingerman. *Zhurnal Tekhnicheskoi Fiziki,* v. 26, no. 9, Sept. 1956, p. 2008-2020.

Heat distribution in electrodes and surface of heat source. Experimental and theoretical data. (P11)

491-P. (Russian.) **Heat Conductivity of Technical Materials at Low Temperatures.** N. V. Zavaritskii and A. G. Zel'dovich. *Zhurnal Tekhnicheskoi Fiziki,* v. 26, no. 9, Sept. 1956, p. 2032-2036.

Measurements on copper, bronze, stainless steel, copper-nickel-zinc alloy, and others. (P11)

492-P. X-Ray Diffraction Determination of the Coefficients of Expansion of Alpha Uranium. J. R. Bridge, C. M. Schwartz and D. A. Vaughan. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, sec. 2, Oct. 1956, p. 1282-1285.

The unit cell dimensions of orthorhombic uranium were deter-

mined over the temperature range −253 to 640° C. Above room temperature, these data were found to fit several equations. Mean coefficients were computed and compared with dilatometer data. (P11, U)

493-P. Difference Between Normal and Superconducting States of a Metal. G. V. Chester. *Physical Review,* v. 103, ser. 2, Sept. 15, 1956, p. 1693-1699.

Properties of differences are established and a numerical calculation is carried out. All differences are of same order of magnitude, but all vanish at transition temperature. Results are discussed from physical point of view. (P15)

494-P. (English.) **The Resistivity-Temperature-Concentration Relationships in β-Phase Titanium-Hydrogen Alloys.** S. L. Ames and A. D. McQuillan. *Acta Metallurgica,* v. 4, no. 6, Nov. 1956, p. 602-610.

Results indicate that at 480° C., below the transformation temperature, the resistivity of beta-titanium would have fallen only 2% below the value of the resistivity immediately above the transformation temperature. (P15, P12, M24, Ti)

495-P. (English.) **Subgrain and Electrical Resistivity Studies of Molybdenum Single Crystals.** K. T. Aust and R. Maddin. *Acta Metallurgica,* v. 4, no. 6, Nov. 1956, p. 632-637.

Resistivity during room-temperature bending increases slightly initially and is followed by rapid coincident with crossing slip bands. Etch-pit density measurements are proportional to reciprocal of bend radius. (P15, Mo)

496-P. (German.) **Calorimetry and Thermodynamics of Lead-Antimony Alloys.** Willy Oelsen, Friedrich Johannsen and Anton Podgornik. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 9, no. 10, 1956, p. 459-469.

Measurements with small calorimeter, thermodynamic evaluation, phase diagram, activity of lead-antimony in liquid mixtures, mixing entropy. (P12, M24, Pb, Sb)

497-P. (Russian.) **A Study of the Temperature Dependence of Heat Conductivity, Electrical Conductivity, and Heat Capacity of Bi, Pb, and Alloys of the Bi-Pb System.** V. E. Mikriukov and N. A. Tiapunina. *Fizika Metallov i Metallovedenie,* v. 3, no. 1, 1956, p. 31-41.

The semiconductive properties found in bismuth-lead alloys are explained by the effect of the solid solution of lead in bismuth, which reduces both electrical conductivity and heat capacity. (P11, P15, N12, Bi, Pb)

498-P. (Russian.) **A Study of Powder Patterns on Transformer Steel Crystals.** V. D. Dylgerov. *Fizika Metallov i Metallovedenie,* v. 3, no. 1, 1956, p. 42-46 + 1 plate.

A study of transformer steel containing 3.42% silicon and displaying texture. (P16, AY)

499-P. (Russian.) **On Magnetic Anisotropy Constants in Iron-Silicon Alloys.** V. V. Druzhinin. *Fizika Metallov i Metallovedenie,* v. 3, no. 1, 1956, p. 47-54.

Determined constants from the moment of rotation of a single-crystal disk in a strong magnetic field. (P16, Fe, Si)

500-P. (Russian.) **The Influence of the Ordering Process on the Temperature Dependence of the Magnetic Properties of a Fe-Ni-Mo Alloy.** M. V. Dekhtiar. *Fizika Metallov i Metallovedenie,* v. 3, no. 1, 1956, p. 55-61.

A study of the temperature dependence of the saturation magnetization of molybdenum permalloys. The abnormalities of the dependence at certain temperatures are considered indicative of an ordering process within the crystal lattice. (P16, AY)

501-P. (Russian.) **Determination of Melting Temperature of Certain Metals Under Superpressure.** V. P. Butuzov and M. G. Gonikberg. *Zhurnal Neorganicheskoi Khimii,* v. 1, no. 7, July 1956, p. 1543-1547.

Measuring melting temperatures of bismuth, tin and lead, under pressures up to 33,000 kg. per sq. cm. (P12, Bi, Sn, Pb)

502-P. (Russian.) **Thermodynamics of Cast Iron Desulphurization.** A. M. Samarin and I. S. Kulikov. *Zhurnal Neorganicheskoi Khimii,* v. 1, no. 7, July 1956, p. 1566-1577.

Distribution and solubility of sulphides in iron. Thermodynamics of desulphurization from experimental and theoretical data. (P12, Fe)

SECTION Q

MECHANICAL PROPERTIES and TEST METHODS; DEFORMATION

1-Q. Fatigue Tests and Aircraft Life Evaluation. Tibor Haas. *Aircraft Engineering,* v. 27, Oct. 1955, p. 334-337.

Experimental correlation of service and fatigue tests at constant stress amplitude. Graphs, diagrams. 21 ref. (Q7, T24)

2-Q. Determination of Strains in Enameled Cast Iron. J. F. Wuellner and B. J. Sweo. *American Ceramic Society, Journal,* v. 38, Nov. 1955, p. 404-407.

Describes method using modification of split-ring furnace and cantilever-type specimens. Photograph, diagram, graphs. 3 ref. (Q25, L27, CI)

3-Q. Stress and Strain in Rolling Mill Housings. II. J. D. Keller. *Blast Furnace and Steel Plant,* v. 43, Nov. 1955, p. 1250-1258.

Discusses housings for cold reducing, hot strip, blooming mills and special housings. Photographs, diagrams. 1 ref. (Q25, F23)

4-Q. Cast Steels. II. J. Lomas. *Canadian Mining Journal,* v. 76, Oct. 1955, p. 80-82.

Mechanical properties and practical applications of austenitic steels. (To be continued.) (Q general, T general, CI)

5-Q. Crack Formation and Stress Concentration Effects in Direct Stress Fatigue. II. N. E. Frost. *Engineer,* v. 200, Oct. 7, 1955, p. 501-503.

Reversed direct stress (zero mean load) fatigue tests were carried out on vee-notched cylindrical specimens of aluminum alloy. Microscopic examination revealed that nonpropagating cracks could be formed in the root of the notch. Graphs, tables. 5 ref. (Q7, Al)

6-Q. On the Theory of the Elasticity of Crystals. C. V. Raman and K. S. Viswanathan. *Indian Academy of Sciences, Proceedings,* v. 42, sec. A, Aug. 1955, p. 51-70.

Shows that tensor representation of elastic strains and stresses should be in unsymmetrical form. Tables. 13 ref. (Q21)

7-Q. The Creep of Metals. N. P. Allen. *Times Science Review,* 1955, Winter, p. 17-18.

Explains some testing procedures and other factors to consider in choosing material to be used at various higher temperatures. Graphs, photograph. (Q3)

8-Q. Handling Spring-Back in High Carbon Steel. J. P. Malloy. *Tooling and Production,* v. 21, Nov. 1955, p. 89-91.

Explains control exercised through choice of material, tooling design and manufacturing method, process finishing or heat treatment. Photographs. (Q21, G general, CN)

9-Q. Experiments on Brittle Fracture of Steel Plates. D. K. Felbeck and E. Orowan. *Welding Journal,* v. 34, Nov. 1955, p. 570S-575S.

High velocity dependence of yield stress found to be decisive factor. Photographs, tables, graphs, diagrams. 16 ref. (Q26, Q23, CN)

10-Q. Inhomogeneous Deformation in Rolling and Wire-Drawing. B. B. Hundy and A. R. E. Singer. *Wire Industry,* v. 22, Oct. 1955, p. 969-971, 973, 996.

Considers advantages and deleterious effects on properties. Diagrams, tables. 25 ref. (Q24, F23, F28)

11-Q. (English.) **A Method for the Measurement of Elastic Relaxation, and Its Use for Determination of the Solubility of Carbon in Alpha-Iron.** E. Lindstrand. *Acta Metallurgica,* v. 3, no. 5, Sept. 1955, p. 431-435.

Spiral samples twisted through certain angle and released tested

photographically for creep. Photographs, diagram, tables. 11 ref. (Q21, Q3, N12, Fe)

12-Q. (English.) **Some Observations on the Internal Friction of Polycrystalline Aluminium During the Early Stages of Creep.** G. B. Brook and A. H. Sully. *Acta Metallurgica,* v. 3, no. 5, Sept. 1955, p. 460-469.

Measurements at strain amplitudes less than 10^{-5} made at constant load of super and commercial-purity aluminum wires at room temperature, 250 and 350° C. Diagram, graphs, micrographs. 16 ref. (Q22, Q3, Al)

13-Q. (English.) **Activation Energies for Creep of Cadmium, Indium, and Tin.** R. E. Frenkel, O. D. Sherby and J. E. Dorn. *Acta Metallurgica,* v. 3, no. 5, Sept. 1955, p. 470-472.

Total plastic strain for high-temperature creep under constant load. Tables, graphs. 14 ref. (Q3, Sn, In, Cd)

14-Q. (Czech.) **Formation of Hydrogen Peroxide on Mechanically Stressed Metals in Aqueous Medium.** Vladimir Seifert, Karel Smrcek, Jan Vorlicek and Ivan Sekerka. *Hutnické listy,* v. 10, no. 10, Oct. 1955, p. 595-600.

During mechanical stressing of metals in an aqueous medium, hydrogen peroxide is formed because of ultrasonic waves which appear during the deterioration of the metallic microstructure. Facts proven by polarographic determination and photographic records of the stressed material. Diagrams, photographs, tables. 9 ref. (Q25, M27)

15-Q. (French and German.) **Hardness Determination.** W. Brandt. *Pro-Metal,* v. 7, no. 46, Aug. 1955, p. 528-540.

Describes and compares various methods of hardness determination with special emphasis on microhardness method and possibility of its standardization. Tables, diagrams, graphs, micrographs. 7 ref. (Q29)

16-Q. (German.) **The Development of Materials Showing High Strength at Elevated Temperatures.** Karl Bungardt. *Stahl und Eisen,* v. 75, no. 21, Oct. 20, 1955, p. 1383-1389.

Discusses austenitic chromium-nickel steels, chromium-cobalt-nickel-iron alloys and nickel and cobalt alloys; possibilities of further developments. Graphs, tables. 9 ref. (Q23, SG-h, Co, Ni, SS)

17-Q. (German.) **Surface Phenomena of an Extended Aluminum Monocrystal Relating to the Extension Speed.** H. Müller and G. Leibfried. *Zeitschrift für Physik,* v. 142, no. 2, 1955, p. 87-115.

Data of theoretical and model investigation on the subject. Graphs, diagrams, photographs, tables. 21 ref. (Q27, Al)

18-Q. (Japanese.) **Study on Fatigue Life of Metals by Means of Progressive Stress Fatigue Testing.** Nobuske Enomoto. *Journal of Railway Engineering Research (Japan),* v. 12, no. 15, Aug. 10, 1955, p. 363-370.

Compares results of this Prot method with those of conventional procedure. Tables, graphs, diagrams. 10 ref. (Q7)

19-Q. (Polish.) **Plastic Deformation of Steel at the Tensile and Hardness Test.** Wojciech Truszkowski. *Archiwum gornictwa i hutnictwa,* v. 3, no. 3, 1955, p. 345-377 + 1 plate.

A greater load is required to initiate plastic deformation in alloys that show a sharp yield point in the tensile test. At the upper yield point, stress decreases rapidly and further elongation occurs at a nearly constant value of stress. Tables, micrographs, graphs. 32 ref. (Q24, Q27, Q29, ST)

20-Q. (Russian.) **Fracture of Metals at High Temperatures.** I. Ia. Dekhtiar and K. A. Osipov. *Doklady Akademii nauk SSSR,* v. 104, no. 2, Sept. 11, 1955, p. 229-232.

Appearance of internal defects in stages preceding fracture; effect of load action and temperature on the development of defects with time. Relates life of material to temperature and load. Graph. 12 ref. (Q26)

21-Q. (Russian.) **Nature of Fracture of Metals During Creep.** V. S. Ivanova. *Metallovedenie i obrabotka metallov,* 1955, no. 1, July, p. 19-26.

Theories suggested include that of the intensity of vacancy formation during creep. Discusses relation between stress and time up to fracture in steels with low creep resistance and of the deformation resistance and cohesive strength to service life of a metal. Graphs, diagrams. 17 ref. (Q26, Q3, ST)

22-Q. (Russian.) **Effect of Initial Heat Treatment on the Brittle Strength of the Nitrided Layer of Steel 38KhMIuA.** N. A. Fertik. *Metallovedenie i obrabotka metallov,* 1955, no. 1, July, p. 57-61.

Isothermal transformations, microstructure, high-frequency induction heating for improving structure. Table, graphs, diagram, micrographs. 2 ref. (Q23, J general, M27, AY)

23-Q. (Russian.) **Effect of Tempered Chromium-Plated Parts on Their**

Wear Resistance and Sticking in Operation. D. N. Garkunov and F. N. Naumov. *Vestnik mashinostroeniia,* v. 35, no. 10, Oct. 1955, p. 34-37.

Effect of tempering temperature and smoothness of chromium coatings on wear. Graphs, diagrams, tables. (Q9, L17, Cr, ST)

24-Q. Elevated Temperature Strength of Selected Zirconium-Base Alloys. R. J. Van Thyne and D. J. McPherson. *American Society for Metals, Transactions,* v. 48, *Preprint No.* 46, 1955, 14 p.

Of the alloys with high strength properties at 650 and 800° C., those with aluminum and tin were superior. Zirconium-tantalum phase relationships appear to be the eutectoid type. Tables. 9 ref. (Q23, M24, Zr)

25-Q. Photo-Elastic Investigation of Armoured Models With an Application to Bending Bars With Cracks on the Tensile Side. R. G. Boiten. *Applied Scientific Research,* v. 5, sec. A, no. 5, 1955, p. 359-373.

Influence of cracks which often occur at the tensile side of reinforced concrete bars. Graphs, photographs, diagrams, tables. (Q27)

26-Q. Research Report on Brittleness of Metals. J. E. McLennan, S. T. M. Johnstone and H. L. Wain. *Australasian Engineer,* 1955, Sept., p. 67-75.

Results of recent work on the brittleness of ferrous alloys, molybdenum and chromium. Photographs, graphs, tables. 43 ref. (Q23, Fe, Mo, Cr)

27-Q. The Collapse Behaviour of Vierendeel Trusses. S. Henderson. *Engineering,* v. 180, Nov. 4, 1955, p. 632-636.

Behavior of several model trusses, compared with simple plastic theory. Photographs, diagrams, graphs. 5 ref. (Q24)

28-Q. Residual Lattice Strains in Sectioned Bars of Plastically Deformed Iron. C. J. Newton and H. C. Vacher. *Journal of Metals,* v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Nov. 1955, p. 1193-1194.

Two test rods were of ingot iron annealed at 910° C.; after deformation they were polished, etched and X-rayed for several readings. Tables. 10 ref. (Q24, M26, Fe-p)

29-Q. Photoelastic Determination of Bending Moments in Curved Frames. V. Cadambe and R. K. Kaul. *Journal of Scientific & Industrial Research,* v. 14, sec. B, Oct. 1955, p. 485-488.

Shows that bending moments can be easily determined from the photoelastic fringe pattern, without recourse to strain energy methods. Application of the theory is illustrated in the case of a thick circular ring under diametral tension. Diagrams, table. 1 ref. (Q25)

30-Q. How to Avoid Brittle Failures in Steel. G. H. Enzian. *Materials & Methods,* v. 42, Nov. 1955, p. 116-118.

Failures can be avoided by careful design, proper heat treatment and care in fabrication. Photographs, graphs. (Q23, CN, AY)

31-Q. Some Recent Experiments in Friction. F. P. Bowden. *Nature,* v. 176, Nov. 19, 1955, p. 944-946.

Measuremens of friction and wear on copper and bismuth at sliding velocities up to 1000 m. per sec. Graph, diagram, micrographs. (Q9, Cu, Bi)

32-Q. Investigation of Plasticity of Technical Titanium. L. N. Sokolov, V. P. Elyutin and V. I. Zalesskii. *Henry Brutcher Translation No.* 3517, 7 p. (From *Izvestiya akademii nauk SSSR, OTN,* 1954, no. 3, p. 110-115.)

Previously abstracted from original. See item 246-Q, 1955. (Q23, Ti)

33-Q. Influence of Cold Working and Aging Upon Strength and Toughness of Low-Carbon Basic Bessemer Steels Blown With Oxygen-Enriched Blast or With an Oxygen-Steam Mixture. A. Krüger. *Henry Brutcher Translation No.* 3534, 29 p. (From *Stahl und Eisen,* v. 74, no. 27, 1954, p. 1757-1766.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 333-Q, 1955. (Q23, D3, CN)

34-Q. (Czech.) **Life of Aluminized and Alited Steels Under High Temperatures.** Pavel Gröbner. *Hutnické listy,* v. 10, no. 10, Oct. 1955 p. 600-605.

Prolongation of the life of aluminized steels at high temperatures can be obtained by certain alloys in the steel. Carbon retards diffusion of aluminum into the steel. Graphs. 12 ref. (Q general, L15, Al, ST)

35-Q. (Hungarian.) **Investigation of the Most Outstanding Mechanical Properties of Special Ductile Alpha + Beta Brasses, as Affected by Heat Treatment. III.** Ede Bella. *Kohaszati lapok,* v. 10, no. 10, Oct. 1955, p. 460-466.

Effects of heat treating NSIII brasses. Tables, graphs, micrographs. 25 ref. (Q23, J general, Cu)

36-Q. (Russian.) **Theory of Fracture of Metals Under Cyclical Loading.** I. A. Oding. *Metallovedenie i obrabotka metallov,* 1955, no. 2, Aug., p. 4-8.

Results of fatigue testing in case of asymmetrical cycles of bending and torsion tests. Theory of crystal lattice vacancies used to explain mechanism of fatigue fracture and peculiarities of stress behavior of metals. Graphs. 11 ref. (Q26, Q7, ST, AY, Cu)

37-Q. (Russian.) **Tendency of Metals to Cold Shortness Under Conditions of Static Tension.** G. I. Pogodin-Alekseev. *Metallovedenie i obrabotka metallov,* 1955, no. 2, Aug., p. 8-14.

Results of static tensile testing of duralumin, steel and brass from 100 to 196° C., including yield point and relative and average elongation: change of properties in reheated steel; relation of plasticity and brittleness to temperature. Tables, graphs. (Q23, Q27, Al, AY, Cu)

38-Q. (Russian.) **Improving Mechanical Properties of Bridge Steel.** L. F. Molotkov, V. M. Iuferov, G. E. Tsukanov, E. M. Chernevich, E. M. Bortunov and N. G. Sorochan. *Stal',* v. 15, no. 10, Oct. 1955, p. 930-937.

Chemical composition of steels; effect of deoxidation method, rolling conditions, normalization and cooling rate after rolling on impact toughness; resulting microstructure and other mechanical properties. Tables, graphs, micrographs. 6 ref. (Q6, Q23, M27, CN)

39-Q. Structure of Cross-Section of Wide-Strip Steel M16S. V. A. Nikitskaia. *Stal',* v. 15, no. 10, Oct. 1955, p. 937-941.

Defects of longitudinal cross sections may be caused, not by the properties of the metals, but by external conditions due to testing: testing time in dynamic bending test of deeply notched specimens is a factor. Effect of anisotropy of metal. Photographs, micrographs, tables. 5 ref. (Q5, Q general, ST)

40-Q. The Effects of Carbon, Oxygen, and Nitrogen on the Mechanical Properties of Titanium and Titanium Alloys. H. R. Ogden and R. I. Jaffee. *Battelle Memorial Institute, Titanium Metallurgical Laboratory Report No. 20,* Oct. 1955, 74 p.

Alpha solute interstitial elements strengthen titanium, although the effect is lost at elevated temperatures. They also have a deleterious effect on toughness, notch sensitivity, weld ductility, machinability and blend ductility. Graphs. 52 ref. (Q general, Ti)

41-Q. Tensile-Creep Properties at 500° F. of Zirconium and a 3.66 Per Cent Uranium Alloy of Zirconium. A. D. Schwope and G. T. Muehlenkamp. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* BMI-799, Nov. 1952, 12 p.

Zirconium is studied from 10,000 to 17,000 psi. and its uranium alloy from 20,000 to 30,000 psi. Tables, graphs. (Q3, U, Zr)

42-Q. Investigation of Wrought Iron-Chromium-Aluminum Alloys for Service at 2200° F. H. A. Saller, J. T. Stacy and N. S. Eddy. *Battelle Memorial Institute, (U. S. Atomic Energy Commission),* BMI-922, June 1954, 46 p.

Effects of a number of added elements on the workability, oxidation resistance, strength, dimensional stability, bend ductility, hardness and microstructure of an iron-chromium aluminum alloy. Tables, graphs, diagram, micrographs. 17 ref. (Q general, Al, Cr, Fe)

43-Q. Nickel-Free and Low Nickel Austenitic Stainless Steels. D. J. Carney. *Blast Furnace and Steel Plant,* v. 43, Dec. 1955, p. 1377-1380.

Completely austenitic steel at 2300° F. can be produced with chromium contents above 17% with little or no nickel, and nitrogen content up to 0.50%. Structure and mechanical properties. Graphs, diagrams, table. 1 ref. (Q general, M27, SS)

44-Q. Creep and Static Friction. R. T. Spurr. *British Journal of Applied Physics,* v. 6, Nov. 1955, p. 402-403.

It is shown that the static friction between a soft metal hemisphere and a flat surface increases with the length of time the surfaces have been in contact and that this increase is due to creep. Such creep might account for the difference between static and dynamic coefficients of friction. Diagram, graphs. 2 ref. (Q9, Q3)

45-Q. Cast Steels. III. J. Lomas. *Canadian Mining Journal,* v. 76, Nov. 1955, p. 76-78.

Mechanical and physical properties. Tables. (Q general, P general, CI)

46-Q. Triaxial Plastic Stress-Strain Relations for an Aluminum Alloy 14S-T4. Joseph Marin and H. A. B. Wiseman. *Franklin Institute, Journal,* v. 260, Nov. 1955, p. 397-409.

It is concluded that the simple flow theory gives a good prediction of the stress-strain relations for various tri-axial stress tests using constant stress ratios, and that for

the variable stress-ratio tests conducted, the simple flow theory is in poor agreement with test results. Diagrams, graphs. 5 ref. (Q27, Al)

47-Q. Experiments on Aluminum Crystals Subjected to Slowly Alternating Stresses. N. Thompson, C. K. Coogan and J. G. Rider. *Institute of Metals, Journal,* v. 84, Nov. 1955, p. 73-80.

Apparatus used to investigate effects of slowly alternating tension and compression on single crystals of pure aluminum. Discusses hysteresis loop, creep and interrelation between creep rate and rate of work hardening. Diagrams, graphs, table. 13 ref. (Q25, Q3, Al)

48-Q. The Theory of Plasticity: A Survey of Recent Achievements. William Prager. *Institution of Mechanical Engineers, Proceedings,* v. 169, no. 21, 1955, p. 41-57.

Applications in mechanical engineering. Diagrams, graphs, photographs. 94 ref. (Q23)

49-Q. Some Experiments Into the Behaviour of Plain and Notched Steel Specimens Under Static and Fatigue Loadings. J. W. Fitchie. *Institution of Mechanical Engineers, Proceedings,* v. 169, no. 18, 1955, p. 331-344.

Results may be useful in indicating influence of variables. Diagrams, graphs, tables. 13 ref. (Q27, Q7, ST)

50-Q. The Effect of Torsional Overstrain Upon the Static Strength of Spring Steel. J. A. Pope and J. E. Andrew. *Institution of Mechanical Engineers, Proceedings,* v. 169, no. 19, 1955, p. 345-360.

Effect of low-temperature heat treatment on the static properties of a hardened and tempered spring steel which had been previously subjected to torsional overstrain. Diagrams, graphs, tables. 11 ref. (Q27, Q1, ST)

51-Q. Deformation of an Explosively Loaded Aluminum Single Crystal. John S. Rinehart. *Journal of Applied Physics,* v. 26, Nov. 1955, p. 1315-1317.

Deformation pattern as it relates to the stresses set up by the explosive and the crystallographic axes of the crystal. Diagrams. 9 ref. (Q24, M26, Al)

52-Q. Deformation and Recrystallization Textures of Rolled Uranium Sheet. Melvin H. Mueller, Harold W. Knott, and Paul A. Beck. *Journal of Metals,* v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Nov. 1955, p. 1214-1218.

Rolling and recrystallization textures in 300° C. rolled uranium sheet investigated using a Geiger counter diffractometer with the modified Schulz reflection technique. Diagrams, tables. 8 ref. (Q24, N5, U)

53-Q. Creep of Polycrystalline Tin. J. E. Breen and J. Weertman. *Journal of Metals,* v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Nov. 1955, p. 1230-1234.

Creep rate studied as a function of temperature and stress in constant stress experiments. Temperature was varied from room temperature to almost the melting point of tin. Graphs. 16 ref. (Q3, Sn)

54-Q. Cleavage Steps on Zinc Monocrystals: Their Origins and Patterns. John J. Gilman. *Journal of Metals,* v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Nov. 1955, p. 1252-1255.

Characteristic cleavage step patterns observed on cleavage surfaces of undeformed, slipped, bent, twinned, compressed and indented zinc crystals. Effect of temperature. Photographs, diagram. 10 ref. (Q24, Zn)

55-Q. Residual Stresses. E. S. Nachtman. *Machine Design,* v. 27, Dec. 1955, p. 211-214.

Effects of residual stresses in cold drawn bars on subsequent fabrication procedures. Graphs. (Q25, F27, CN)

56-Q. The Effects of Alloying Additions on the Properties of Carbon Steels. A. G. Gardner. *Machinery (London),* v. 87, Nov. 11, 1955, p. 1143-1146.

Effects of nickel, chromium, tungsten, molybdenum, vanadium, cobalt, aluminum, manganese, phosphorus, silicon or sulphur on mechanical and physical properties. (Q general, P general, AY)

57-Q. Effect of Temperature on the Flow Stress of Work-Hardened Copper Crystals. M. A. Adams and A. H. Cottrell. *Philosophical Magazine,* v. 46, 7th ser., no. 382, Nov. 1955, p. 1187-1193.

Changes in the flow stress of copper crystals due to changes in the temperature of deformation have been measured. The change of flow stress with temperature is closely proportional to the flow stress itself. Graphs, tables. 15 ref. (Q24, Cu)

58-Q. The Formation of Cracks in Plastic Flow. II. A. N. Stroh. *Royal Society, Proceedings,* v. 232, ser. A, Nov. 22, 1955, p. 548-560.

Detailed mechanism by which a piled-up group of dislocations generates a crack. It is suggested that

a crack arises from short-range non-Hookian interactions of the dislocations at the head of the pile-up, and a model which takes some account of this is developed. Diagrams, graph. 15 ref. (Q26, M26)

59-Q. War on Wear. Van Caldwell. *Steel,* v. 137, Nov. 28, 1955, p. 98-101.

Causes of wear, preventive measures, alloys for impact and abrasion resistance, surface treatment processes. Tables. (Q9, L general)

60-Q. Friction in the Processing of Metals. Antoni Niedzwiedzki. *Tooling and Production,* v. 21, Dec. 1955, p. 98-102.

Shows to what extent chip formation and other metal processing phenomenon can be explained in terms of friction. Graphs, tables, diagrams. 29 ref. (Q9, G17)

61-Q. Mechanical Properties of Zirconium and Its Alloys. W. Chubb, G. T. Muehlenkamp, F. R. Shober and A. D. Schwope. Paper from "The Metallurgy of Zirconium". National Nuclear Energy Series, Division VII—v. IV. McGraw-Hill Book Co., p. 490-552.

Tensile, impact, creep and hardness characteristics. Effects of composition, structure, heat treatment and deformation on these properties. Tables, graphs, photographs, micrographs. 70 ref. (Q general, Zr)

62-Q. A Method for Estimating Allowable Load Capacities of Columns Subject to Creep. R. L. Carlson and A. D. Schwope. Paper from "Proceedings of the Second U.S. National Congress of Applied Mechanics." 1954. The American Society of Mechanical Engineers, p. 563-568.

Method utilizes approximate stress distributions derived from iso-stress-strain curves to determine column loads which are shown to be conservative for the time for which a determination is made. Graphs. 10 ref. (Q3)

63-Q. Industrial Applications of X-ray Stress Analysis. A. Snaal. *Henry Brutcher Translation No.* 3089, 9 p. (Abridged from *Archiv Eisenhüttenwesen,* v. 26, no. 8, 1955, p. 445-447.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 906-Q, 1955. (Q25, M22)

64-Q. (Russian.) **Influence of Hydrogen on Mechanical Properties of Electrolytic Nickel.** A. L. Rotinian, E. Sh. Ioffe, E. S. Kozich and I. I. Iusova. *Doklady akademii nauk SSSR,* v. 104, no. 5 Oct. 11, 1955, p. 753-755.

Effect of hydrogen and hydrides adsorbed from electrolyte by surface of growing deposit. Graphs. 17 ref. (Q general, C23, Ni)

65-Q. (Russian.) **Study of Texture of Cold Rolling and Recrystallization in Iron and Its Alloys With Silicon.** K. V. Grigorov, G. P. Bloknin, E. A. Korzun and M. I. Zakutner. *Fizika metallov i metaltovedenie,* v. 1, no. 1, 1955, p. 36-47.

Texture of deformation and of primary recrystallization; effect of annealing during cold rolling of recrystallization texture and of grain coarsening on texture of primary recrystallization. Graphs, diagrams. 8 ref. (Q24, N5, J23, ST, Fe)

66-Q. (Russian.) **Effect of Columbium and Titanium on the Properties of Stainless Steel.** A. M. Samarin and A. A. Iaskevich. *Izvestiia akademii nauk SSSR, otdelenie tecknicheskikh nauk,* 1955, no. 10, Oct., p. 107-116 + 2 plates.

Chemical composition, mechanical properties of castings of these steels with various heat treatments, resistance to intercrystalline and chemical corrosion; weldability. Tables, micrographs, graphs. (Q23, R2, R6, K9, SS, Cb, Ti)

67-Q. (Russian.) **Study of Microhardness of Solid Solutions in Relation to Composition.** V. M. Glazov, G. A. Korol'kov and I. D. Chistiakov. *Izvestiia akademii nauk SSSR, otdelenie tekhnicheskikh nauk,* 1955, no. 10, Oct., p. 143-146.

Microhardness-composition relations for aluminum alloys with tantalum, lead or copper. The last alloy was quenched from different temperatures. Graphs, table. 6 ref. (Q29, Al)

68-Q. On the Danger of Combined Stresses in Pressurized Structures. M. Zaustin. *Aeronautical Engineering Review,* v. 14, Dec. 1955, p. 45-48.

Failure of the Comets explained in terms of fuselage shell brittleness. Points out the need to replace the tensile theory of the strength of materials with a new criterion. Diagram. (Q25, Q23, Al, ST)

69-Q. Effect of Yielding on the Fatigue Properties of Test Pieces Containing Stress Concentrations. K. Gunn. *Aeronautical Quarterly,* v. 6, Nov. 1955, p. 277-294.

A method of estimating the fatigue properties of notched test pieces when cyclic loads are applied in the presence of mean stresses. Method takes into account the local yielding which occurs near the base of the notch when the nominal stresses are sufficiently high. Graphs, diagrams. 4 ref. (Q7, Q25)

70-Q. Initial Investigation of Niobium and Niobium-Base Alloys. Henry A. Saller, John T. Stacy and Stanley W. Porembka. *Battelle Memorial Institute (U. S. Atomic Energy Commission)*, BMI-1003, May 1955, 40 p.

Factors influencing fabrication characteristics of the arc-melted alloys. Graphs, micrographs, tables, diagrams. 7 ref.
(Q general, F general, Cb)

71-Q. Hydrogen in Mild-Steel Weld Deposits. N. Christensen and R. Rose. *British Welding Journal*, v. 2, Dec. 1955, p. 550-558.

Formation of internal microcracks studied in single-run deposits from 11 brands of Continental electrodes. Preliminary experiments illustrating a new method suggested for study of cracking under controlled cooling rates. Resemblance between fish-eyes and brittle spots due to hydrogen cracks. Diagrams, micrographs, tables. 17 ref. (Q26, K9, ST)

72-Q. (Czech.) **Calculation of Strength of Machine Parts Subject to Fatigue Stresses.** F. Budinsky and V. Jirasek. *Strojirenstvi*, v. 5, no. 8, Aug. 1955, p. 587-588 + 4 p. suppl.

Two problems which demonstrate the use of the supplementary tables in testing axles and shafts by bending and torsion. Effect of notch sensitivity on fatigue limit. Tables, graphs. (Q7, Q1, Q5, ST, CI)

73-Q. (Czech.) **Testing of Ferritic Steels at Low Temperatures.** Jar. Kermes. *Strojirenstvi*, v. 5, no. 8, Aug. 1955, p. 598-605.

Effect of low temperatures on the operational reliability of parts subject to dynamic stress and reasons for brittleness resulting at such temperatures. Effect of various factors on critical temperature and of heat treatment and chemical composition. Tables, graphs, micrograph, photograph. 11 ref.
(Q23, J general, SS)

74-Q. (German.) **Determination of Rigidity and Resilience Properties of Soft Copper Wire.** F. Glander. *Metall*, v. 9, nos. 21-22, Nov. 1955, p. 972-978.

Relation between resilience properties and rigidity; direct measurement of resilience; bending tests. Tables, graphs, diagrams, photographs. 8 ref. (Q23, Q5, Cu)

75-Q. (German.) **Development and Present State of the Nonmagnetic Steels.** Walter Grass. *Stahl und Eisen*, v. 75, no. 23, Nov. 17, 1955, p. 1558-1562.

Surveys the situation with respect to Germany and other countries. Graph, tables. 9 ref.
(Q general, ST)

76-Q. (German.) **Hardening and Deformability of Copper-Chromium Alloys.** Wolfgang Gruhl and Rudolf Fischer. *Zeitschrift für Metallkunde*, v. 46, no. 10, Oct. 1955, p. 742-748.

Measurement of hardness of alloy after cold deformation and aging and deformations during different stages of aging; X-ray and electron microscope investigation and comparison with aluminum alloys. Table, graphs, micrographs, diffractograms. 16 ref.
(Q24, Q29, M22, N7, Cu, Cr)

77-Q. (German.) **Measurement of Latent Deformation Energy of Drawn Copper Wire.** Konrad Bohnenkamp, Kurt Lücke and Georg Masing. *Zeitschrift für Metallkunde*, v. 46, no. 10, Oct. 1955, p. 765-770.

Determination of latent deformation energy by differentiation method and accompanying heat development. Tables, graphs, diagrams. 24 ref. (Q24, F28, Cu)

78-Q. (Japanese.) **Strength of Structural Parts of Plate Girders.** Yoshiaki Tada and Takayoshi Shiraishi. *Journal of Railway Engineering Research (Japan)*, v. 12, nos. 16-17, Sept. 10, 1955, p. 389-433.

Ultimate load-bearing strength of each member of the test girders was calculated and shows that the compressive flange has the least strength, yet it has a safety factor as high as 2.6 to 3.1; the web has a higher strength; and the strength of stiffeners was excessive. Diagrams, tables, graphs, photographs. 4 ref. (Q23, AY)

79-Q. Quantitative Determination of Rolling and Recrystallization Textures in 600 and 300° C. Rolled Uranium Rods. Warren P. Chernock and Paul A. Beck. *Argonne National Laboratory (U. S. Atomic Energy Commission)*, AECD-3663, Aug. 1951, 38 p.

Rolling textures consist of two fiber texture components in which the (010) and the (110) planes are perpendicular to the rod axis. Recrystallization texture of a rod having a (010) rolling texture consists of the (010) and the (140) fiber texture components. Diagrams, graphs, photographs. 19 ref. (Q24, N5, U)

80-Q. Mechanical and Metallurgical Properties of Thorium. A. D. Schwope, G. T. Muehlenkamp and L. L. Marsh. *Battelle Memorial Institute (U. S. Atomic Energy Commission)*, BMI-784, Nov. 1952, 29 p.

Thorium is evaluated as a poten-

tial material, subject to reactor strength requirements. Tables, graphs. (Q general, Th)

81-Q. Investigation of Wrought Iron-Chromium-Aluminum Alloys Containing Platinum and Palladium. Henry A. Saller, John T. Stacy and Stanley W. Porembka. *Battelle Memorial Institute (U. S. Atomic Energy Commission)*, BMI-1017, July 1955, 20 p.

Addition of up to 20 wt.% platinum and palladium increased oxidation resistance and short-time stress-rupture strength at higher temperatures. Micrographs, graphs, tables. (Q23, R2, Cr, Fe, Al)

82-Q. Causes of Failure in Internal Combustion Engine Valve Springs With Particular Reference to Fatigue. J. H. Darley. *Gas and Oil Power, (Annual Technical Review Number)*, v. 50, 1955, p. 335-338.

Typical causes of defects and the use of coatings and mechanical treatment to overcome failures. Tables. 7 ref. (Q7, St)

83-Q. An Investigation of the Factors Contributing to the Failure of Diesel Engine Pistons and Cylinder Covers. D. Fitzgeorge and J. A. Pope. *Gas and Oil Power, (Annual Technical Review Number)*, v. 50, 1955, p. 350, 352.

Stresses that occur in combustion-chamber parts discussed with regard to their nature, magnitude and likely contribution to failure. Physical and mechanical constants of the material which affect the thermal stresses and modifying influence of plastic deformation. Diagrams. (Q25, Q24)

84-Q. An Investigation of the Bending of Angle Beams in the Plastic Range. H. Norman Abramson, Harry A. Williams and Bruce G. Woolpert. *Journal of the Aeronautical Sciences*, v. 22, Dec. 1955, p. 818-828.

Attempts to determine to what extent a relationship between bending moment at the midspan and outer fiber stress will agree with the applied end moment if a simplified theoretical approach is used in the analysis. Photographs, graphs, tables, diagrams. 17 ref. (Q5, Al)

85-Q. Elastic-Stress Waves Produced by Pressure Loads on a Spherical Shell. J. H. Huth and J. D. Cole. *Journal of Applied Mechanics*, v. 22, Dec. 1955, p. 473-478.

Treats problem of stresses in a spherical elastic shell subjected to a plane pressure wave traveling across it with constant speed, a case of technical interest when considering the effect of blast waves on the structure of a missile in flight. Graphs. 9 ref. (Q25)

86-Q. Plastic Deformations of a Free Ring Under Concentrated Dynamic Loading. R. H. Owens and P. S. Symonds. *Journal of Applied Mechanics*, v. 22, Dec. 1955, p. 523-529.

Attempts to determine the deformations of the ring when the force magnitudes are such that plastic strains, large compared with elastic strains, occur. By neglecting elastic strains and assuming ideally plastic behavior, approximations to the final deformations of the ring are obtained. Graphs, diagrams. 5 ref. (Q24)

87-Q. Creep of High-Purity Nickel. *National Bureau of Standards, Technical News Bulletin*, v. 39, Dec. 1955, p. 162-164.

Precise data on creep in the first two stages. Micrographs, graphs. 2 ref. (Q3, Ni)

88-Q. Effects of Temperature on the Plastic Properties of Aluminum Crystals. A. H. Cottrell and R. J. Stokes. *Royal Society, Proceedings*, v. 233, ser. A, Dec. 6, 1955, p. 17-34 + 2 plates.

By changing the temperature of deformation, during tensile experiments on single crystals, it is possible to separate reversible changes of flow stress with temperature from irreversible ones. It is proposed that, under the combined influence of stress and temperature, sessile dislocations at the heads of piled-up groups of dislocations become unlocked; the piled-up groups then partly collapse and many dislocations are released for slip. The reversible changes of flow stress are interpreted in terms of the intersection of dislocation lines. Tables, graphs, photographs. 30 ref. (Q27, M26, Al)

89-Q. Fatigue of Aircraft. P. L. Teed. *Shell Aviation News*, 1955, no. 208, Oct., p. 14-21.

History of the evolution of aerodynamics. Data on the stresses imposed on an aircraft and effects of built-in stresses. Photograph, diagrams, tables, graphs. (Q7, Al)

90-Q. Failure of Materials Under Combined Repeated Stresses With Superimposed Static Stresses. George Sines. *U. S. National Advisory Committee for Aeronautics, Technical Note* 3495, Nov. 1955, 69 p.

Bi-axial alternating stresses and simple combinations of static stress, with alternating stress, is shown to

lead to a general criterion for the effect of static stress on the permissible amplitude of alternating stress. Graphs, diagrams, photographs, tables. 45 ref. (Q25, Q7)

91-Q. Tensile Properties of Zirconium and Zirconium Alloys. I. Zirconium and Alloys With Oxygen, Columbium, Tin, Copper, Vanadium, Tungsten, and Tantalum. C. R. Simcoe and W. L. Mudge, Jr. *Westinghouse Electric Corporation (U. S. Atomic Energy Commission),* AECD 3680, Nov. 1951, 70 p.

Tensile properties of rolled and annealed sheets, in the range from room temperature to 750° F., were determined as a function of temperature. Yield and tensile strengths are lower than those previously reported. Graphs, micrographs, photographs, tables, diagram. 1 ref. (Q27, Zr)

92-Q. (Czech.) **Choice of Materials for Parts Subject to Abrasive Wear.** J. Shon. *Strojirenstvi,* v. 5, no. 7, July 1955, p. 525-529.

Influence of impact stress on choice of alloys to increase abrasion resistance. Properties of manganese steel. Hard-facing as an economical substitute for alloying. Tables. (Q9, L24, CI, AY, SG-m)

93-Q. (French.) **Lowering the Apparent Limit of Elasticity of Steels by Creep After Beginning of Cold Working at Ordinary Temperature.** Ferdinand Campus and Kasimierz Gamski. *Comptes rendus,* v. 241, no. 22, Nov. 28, 1955, p. 1552-1554.

Study of carbon-manganese-silicon and carbon-manganese steels subjected to drawing. 1 ref. (Q21, Q3, AY-p)

94-Q. (French.) **Study of the Mechanical Relaxation of Residual Welding Stresses During Static Stress and Fatigue.** F. Hebrant, H. Louis, W. Soete and A. Vinckier. *Revue de la soudure (Brussels),* v. 11, no. 3, 1955, p. 139-151.

Research on the influence of residual stresses on the possible behavior of a welded object. Diagrams, tables, graphs, photographs. (Q25, K9)

95-Q. (French.) **Methods of Fracture as a Function of the Stress State and Temperature.** F. Hebrant, H. Louis, W. Soete and A. Vinckier. *Revue de la soudure (Brussels),* v. 11, no. 3, 1955, p. 152-173.

Research on the fracture of typical welded assemblies from design considerations. Factors influencing brittle fracture. Graphs, photographs, tables, diagrams. (Q26, K general)

96-Q. (French.) **Torsion Test, Method of Inspecting Flat Pieces of Effervescent Steel.** J. Nils. *Revue universelle des mines,* v. 98, ser. 9, no. 11, Oct. 1955, p. 499-500.

Test for economic evaluation of the compactness of effervescent steel ingots. Diagram. (Q1, ST)

97-Q. (Russian.) **Amount of Worn Material as Index to Extent of Wear.** V. B. Liadskii. *Liteinoe proizvodstvo,* 1955, no. 10, Oct., p. 10-13.

Analyzes process of wear through friction by study of the wear-products. Suggests application of the method for different types of ferrous materials. Tables, diagrams. (Q9, CI)

98-Q. (Russian.) **The Theory of Anti-Friction Properties of Ductile Cast Iron.** Ia. G. Lifshits. *Liteinoe proizvodstvo,* 1955, no. 10, Oct., p. 22-23.

Comparative evaluation of anti-friction pearlite-ferrite and normalized forgeable cast iron, and the anti-friction gray cast iron Ts-1 and Ts-2, as bearing materials. 8 ref. (Q9, CI)

99-Q. (Russian.) **Endurance Strength of Copper and Some Copper Alloys.** A. P. Simakovskii. *Metallovedenie i obrabotka metallov,* 1955, no. 3, Sept., p. 32-38.

Chemical composition and mechanical properties with different temperatures and treatment. Tables, graphs. (Q general, Cu)

100-Q. (Russian.) **Hardness of Surface Diffusion Layers at High Temperatures.** G. F. Beliaeva and M. G. Lozinskii. *Metallovedenie i obrabotka metallov,* 1955, no. 3, Sept., p. 54-57.

Determination of surface hardness at temperatures up to 1100° C. in vacuum. This method permits the determination of the character of diffusion layers in the range of operating temperatures. Graphs, micrographs. 8 ref. (Q29, N1)

101-Q. (Russian.) **Mechanical Properties of Large Forged Pieces.** A. N. Zhironkin, A. D. Men'shikov, and P. D. Khinskii. *Stal',* v. 15, no. 11, Nov. 1955, p. 1016-1022.

Heat treated cross sections of large pieces (700 mm. in diam.) showed marked increase of nonuniformity in properties of metal which is explained by increased hydrogen concentration in the deeper layers of the piece. Tables, graphs, diagrams. (Q general, F22)

102-Q. (Spanish.) **Determination of the Elastic Constants of Metallic Materials by Sound Propagation Measurements.** H. J. Seemann. *Instituto*

del hierro y del acero, v. 8, no. 38, July-Sept. 1955, p. 398-405.

Methods and calculations. Graphs, oscillograms, diagrams. 14 ref. (Q21)

103-Q. How Oil Viscosity Affects Piston Ring Wear. M. Popovich and L. E. Johnson. *Automotive Industries,* v. 114, Jan. 1, 1956, p. 56-57, 106.

Tests correlate engine wear with oil viscosity. Viscosity range of SAE 10 to 20 appears ideal. Graphs, diagram. (Q9)

104-Q. Plain-Bearing Fatigue Testing. E. D. Brailey and W. J. Donnelly. *Communications and Electronics,* v. 3, Jan. 1956, p. 16-18.

Testing of engine-bearing systems using electronic and hydraulic techniques. Diagrams, photographs, graph. (Q7)

105-Q. An Apparatus for Obtaining the Tensile Properties of Irradiated Materials at Elevated Temperatures. R. E. Hueschen and D. C. Kaulitz. *Hanford Atomic Products Operation (U. S. Atomic Energy Commission),* HW-38991, Sept. 1955, 22 p.

Tensile-testing unit which permits testing of highly radio-active specimens at temperatures up to 800° C. The vacuum tensile furnace, mounted on a 60,000-lb. Baldwin tensile machine, is constructed to permit measurement of elongation by a newly developed optical instrument. Graphs, table, diagrams, photographs. (Q27, ST, SS)

106-Q. Final Report on Development and Testing of Nickel-Molybdenum Alloys. F. C. Monkman, Jr., N. J. Grant and C. F. Floe. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission),* ORNL-1990, Nov. 1955, 43 p.

Determines effect of vacuum melting and variations in composition on the ductility, mechanical and stress-rupture properties of nickel-molybdenum alloys. Tables, diagram, graphs, micrographs. (Q23, Q4, C25, Ni, Mo)

107-Q. Stresses From Radial Loads and External Moments in Cylindrical Pressure Vessels. P. P. Bijlaard. *Welding Journal,* v. 34, Dec. 1955, p. 608S-617S.

Design information on deflections, bending moments and membrane forces and on influence of internal pressure. Diagrams, graphs, tables. 4 ref. (Q25)

108-Q. Longitudinal Deformation of Long Beam Due to Fillet Welding. Tokutano Sasayama, Koichi Masubuchi and Sigeru Moriguchi. *Welding Journal,* v. 34, Dec. 1955, p. 581S-582S.

Effects of joint dimension, weight of deposited metal, other welding procedures on deformation. Diagrams, table, graphs. (Q24, K1, ST)

109-Q. Studies on the Brittle Failure of Tankage Steel Plates. F. J. Feely, Jr., M. S. Northup, S. R. Kleppe and M. Gensamer. *Welding Journal,* v. 34, Dec. 1955, p. 596S-607S.

Studies progress of fractures under conditions similar to those in real structures, correlates results with values obtained from conventional tests. Diagrams, graphs, tables. 14 ref. (Q26, ST)

110-Q. (English.) **On the Effect of Ordering Upon the Strength of Cu_3Au.** G. W. Ardley. *Acta Metallurgica,* v. 3, no. 6, Nov. 1955, p. 525-532.

Room-temperature strength decreases as the degree of long-range order within the antiphase domains increases, and as these domains grow larger the room-temperature strength first increases and then decreases. Graphs, table. 28 ref. (Q23, N10, Cu, Au)

111-Q. (English.) **Some Anelastic Phenomena in Alloys of Gold and Nickel.** Choh-Yi Ang, J. Sivertsen and C. Wert. *Acta Metallurgica,* v. 3, no. 6, Nov. 1955, p. 558-565.

Two relaxation peaks are found in polycrystalline alloys between room temperature and 600° C. One of these peaks has been identified as the order peak, the origin of the other is uncertain. Diagram, graphs, micrographs, tables. 14 ref. (Q22, Au, Ni)

112-Q. (English.) **Mechanism of Internal Friction Due to the Motion of the Dislocation.** Tokutaro Hirone, Nobuhiko Kunitomi and Masajiro Abe. *Physical Society of Japan, Journal,* v. 10, no. 11, Nov. 1955, p. 960-966.

Studied from the measurement on the variation of internal friction with cold work. For copper, internal friction increases with the initial cold work and decreases after showing a maximum. Diagram, graphs, table. 12 ref. (Q22, Cu)

113-Q. (Italian.) **Fatigue Resistance Test FR of Light Alloys. Influence of Experimental Factors.** G. Panseri and F. Gatto. Alluminio, v. 24, no. 5, Sept.-Oct. 1955, p. 447-458.

Results of a series of tests for the determination of the influence of shape, size and superficial finishing of specimens on the results of fatigue resistance tests. Tables, diagrams, micrographs, graphs. 11 ref. (Q7, Al)

114-Q. (Italian.) **Researches Concerning the Anisotropy of the Resistance to Fatigue of Ergal 65 TA Alloy.** C. Panseri and F. Gatto. *Alluminio,* v. 24, no. 5, Sept.-Oct. 1955, p. 459-463.

Dispersion of test results prevented comparisons between specimens. Causes of the variations could not be identified. Tables, diagrams, graphs. 8 ref. (Q7, Al)

115-Q. (Japanese.) **Influence of Copper on Spring Steel (Sup 6). II.** Toshio Kodaira and Yoichi Yasuda. *Iron & Steel Institute of Japan, Journal,* v. 41, no. 10, Oct. 1955, p. 1098-1102.

Influences of copper content on the properties, at ordinary temperatures, of silicon-manganese spring steel. Graphs, table. 5 ref.
(Q general, AY, SG-b)

116-Q. (Japanese.) **Studies on Ball Bearing Steels. II. Effect of Some Metallurgical Factors on Life of Ball Bearing Steels.** Manabu Ueno, Tetsutaro Mitsuhashi and Yutaka Nakano. *Iron & Steel Institute of Japan, Journal,* v. 41, no. 10, Oct. 1955, p. 1102-1107.

To determine relation between some metallurgical factors and life, chemical composition, nonmetallic inclusions, hardness, compressive load of inner rings, cementite content, grain size and forging degree were tested. Graphs. 5 ref.
(Q9, AY, SG-c)

117-Q. (Japanese.) **Studies on Mechanical Properties of 19-9 DL.** Taro Hasegawa, Osamu Ochiai and Junich Ino. *Iron & Steel Institute of Japan, Journal,* v. 41, no. 10, Oct. 1955, p. 1112-1118.

Effect of columbium is distinct at longer time or higher temperature of testing and at "hot cold working" rather than in age hardened state. Tables, graphs, micrographs. 2 ref. (Q general, SS)

118-Q. A Remotely Operated Extensometer. R. G. Berggren and J. C. Wilson. *ASTM Bulletin,* 1955, no. 210, Dec., p. 35-38; disc., p. 38.

Sensitive instrument developed for use in tension testing of highly radio-active metallic specimens. Design, operation, and advantages. Diagrams, photograph. 2 ref. (Q27)

119-Q. Tensile Stripping Tests on B.S.W. ¾ In.10 T.P.I. Threads. J. E. Field. *Engineer,* v. 200, Dec. 23, 1955, p. 901-902.

Static stripping tests carried out on high-tensile steel bolts and nuts, high-tensile bolts with mild steel nuts and on low-tensile steel bolts with high-tensile nuts to determine the relationship between nut height and stripping strength of assemblies. Diagram, graph, tables. (Q27, AY)

120-Q. Tensile Properties of Some Titanium Ternary Solid Solutions and Duplex Alloys Up to 600° C. J. W. Suiter. *Institute of Metals, Journal,* v. 84, Dec. 1955, p. 81-83 + 1 plate.

Ternary solid solutions followed the same general pattern as for the binary solutions, in that strength decreases rapidly up to 300° C., remains almost constant between 350 and 500° C., and decreases rapidly at high temperatures. Graphs, 4 ref. (Q27, Ti)

121-Q. The Relationship Between The First Development of Slip Lines and Metallographic Slip-Line Indications in 70:30 Brass. L. E. Samuels and M. Hatherly. *Institute of Metals, Journal,* v. 84, Dec. 1955, p. 84-86 + 1 plate.

Experimental technique has shown that a small but definite amount of shear must have occurred on a slip-line in the brass before a metallographic slip-line indication could be developed at its trace by the most sensitive etching methods. 11 ref. (Q24, Cu)

122-Q. The Mechanism of Embrittlement by a Liquid Phase. R. Eborall and P. Gregory. *Institute of Metals, Journal,* v. 84, Dec. 1955, p. 88-90 + 1 plate.

Experimental data on the spread of a liquid phase over the boundaries of a metal in the absence of stress. Graphs, table. 8 ref.
(Q26, Q23, Pb, Cu, Sn, Zn)

123-Q. On the Plastic Flow of Metals Under Conditions of Axial Symmetry. R. T. Shield. *Royal Society, Proceedings,* v. 233, ser. A, Dec. 20, 1955, p. 267-287.

Axially symmetric plastic flow of a rigid-plastic nonhardening material which obeys the Tresca yield criterion of constant maximum shearing stress and the associate flow rule. Diagrams, graphs, tables. 17 ref. (Q24)

124-Q. What You Can Do About Metal Fatigue. Allen G. Gray. *Steel,* v. 138, Jan. 16, 1956, p. 68-72.

Precautionary measures to prevent fatigue failure, reasons for metal fatigue and pointers which may be used in fatigue testing. Graphs, photographs. (Q7)

125-Q. (Czech.) **Stresses in Reinforced Sheet or Plate.** V. Placak. *Strojirenstvi,* v. 5, no. 9, Sept. 1955, p. 643-651.

Calculation of bending and twist-

ing stresses in infinitely long plates strengthened by variously shaped ribs or braces. Equations for internal and external deformation work and forces. Critical shear stress. Diagrams, photographs. 18 ref. (Q25, Q24, Q2)

126-Q. (Czech.) **Statistical Theory of the Fatigue of Material.** J. Sedlacek. *Strojirenstvi,* v. 5, no. 11, Nov. 1955, p. 859-863.

Determination of slope, shape and other parameters of curves graphically and analytically. Graphs, table. 9 ref. (Q7)

127-Q. (French.) **Description of a Universal Apparatus for Elastic Damping of Metals. Applications to Aluminium.** H. J. Seemann. *Revue de métallurgie,* v. 52, no. 11, Nov. 1955, p. 864-868.

Equipment to gage elastic damping capacity of metals over a spread of frequency, temperature and deformation amplitude applied to 99.997% aluminum. Graphs, diagrams. 6 ref. (Q8, Al)

128-Q. (Russian.) **Effect of Tempering on the Hardness of a Surface Layer Hardened by the Electrospark Method.** G. P. Ivanov, V. A. Belianin and V. V. Borisova. *Metallovedenie i obrabotka metallov,* no. 4, Oct. 1955, p. 48-51.

Effect of electrode material (chromium, tungsten, ferrochromium) and tempering temperature on properties of the hardened layer. Graphs, table. 5 ref. (Q29, J29, G17, ST)

129-Q. (Russian.) **Methods of Calculating Tendency of Steel to Brittle Fracture in Welded Storage Tanks.** A. S. Fal'kevich, L. S. Livshits and S. I. Panich. *Svarochnoe proizvodstvo,* no. 12, Dec. 1955, p. 8-10.

Temperature and other conditions under which welded oil tanks develop brittle state and cracking. Critical temperature of brittleness in relation to impact strength, before and after aging. Tables, diagrams, micrograph, photograph. 4 ref. (Q26, Q6, K1, K2, ST)

130-Q. (Russian.) **Formation of Cracks in Welded Constructions.** G. A. Nikolaev. *Svarochnoe proizvodstvo,* no. 12, Dec. 1955, p. 1-4.

Analysis of cracks caused by fatigue and residual stresses. (Q25, Q7, K9, ST)

131-Q. (Russian.) **Nonlinear Equations for Creep and Relaxation of Materials in Complex Stressed State.** M. I. Rozovskii. *Zhurnal tekhnicheskoi fiziki,* v. 25, no. 13, Nov. 1955, p. 2339-2354.

Relation of instantaneous modulus of elasticity to degree of deformation. Relation of relaxation time to stress. 14 ref. (Q3)

132-Q. A 600-Ton Test Rig for Brittle Fracture Research. A. A. Wells. *British Welding Journal,* v. 3, Jan. 1956, p. 25-30.

Development of special rig using hydraulic capsules for intermediate tests on brittle fracture. Information on stress distribution and structural strength, capsule assemblies, hydraulic system, stability under load, load and extension records, test plate cooling, conditions at fracture, trials. Diagrams, graphs, photograph. 2 ref. (Q26, ST)

133-Q. A Model of Mechanical Behavior Evaluated With Creep Tests Applied to Alpha Uranium. K. R. Merckx. *Hanford Atomic Products Operation (U. S. Atomic Energy Commission),* HW-40494, Nov. 1955, 17 p.

Behavior of uranium in the temperature range of 100 to 300° C., considers the stress, strain, time and temperature dependence of strain rate. Parameters of the model evaluated with creep tests; method must be modified in the higher temperature ranges. Graphs. 10 ref. (Q3, U)

134-Q. On the Thermal Aspect of Fatigue. A. M. Freudenthal and J. H. Weiner. *Journal of Applied Physics,* v. 27, Jan. 1956, p. 44-50.

Attempt to explain phenomenon of progressive deterioration of the strength of metals and alloys due to the action of repeated load cycles. Diagrams, micrograph. 24 ref. (Q7)

135-Q. Experimental Test of the Theory of Penetration by Metallic Jets. R. J. Eichelberger. *Journal of Applied Physics,* v. 27, Jan. 1956, p. 63-68.

Measurement of jet and penetration velocities as functions of depth of penetration for lined cavity charges fired into several types of target material under a variety of experimental conditions. Diagram, graphs. 7 ref. (Q general)

136-Q. Final Report Joint AEC-ASME Program on Thermal Stress Fatigue. L. F. Coffin, Jr. *Knolls Atomic Power Laboratory (U. S. Atomic Energy Commission),* KAPL-1411, Sept. 1955, 60 p.

Results of investigation on thermal cycling to produce tensile stresses at the higher temperature end of the thermal cycle rather than compression, and on the inde-

pendent variation of strain and temperature amplitude. Graphs, diagrams, photographs. (Q7, SS)

137-Q. Why Specify Ductility? W. K. Bock. *Machine Design,* v. 28, Jan. 12, 1956, p. 133-136.

An analysis of the practical significance of ductility as a material property. Diagram, graphs. 4 ref. (Q23)

138-Q. Approximate Strength of Jet Engine Alloys After Optimum Treatment. *Metal Progress,* v. 69, Jan. 1956, p. 96B.

Data sheet with reference to temperature, tensile test, stress-rupture. (Q23, Q27, Q4, SG-h)

139-Q. Wear of Metals by Sand Erosion. Werner A. Stauffer. *Metal Progress* v. 69, Jan. 1956, p. 102-107.

A 15-hr. test is able to determine sand erosion of various constructional materials to ±5% reproducibility and the results correlate with experience on hydraulic turbines. Diagram, graphs, photographs, tables. (Q9)

140-Q. The Role of Thin Surface Films in the Deformation of Metal Monocrystals. John J. Gilman. Paper from "Symposium on Basic Effects of Environment on the Strength, Scaling, and Embritlement of Metals at High Temperatures". ASTM Special Technical Publication No. 171, p. 3-11; disc., p 11-13.

Review of the literature on the strengthening effects of surface films on monocrystals. New data confirm the viewpoint that strengthening effects cannot be explained in terms of the film itself. Graphs, table, X-ray spectra. 27 ref. (Q23, Q24, Zn, Cd)

141-Q. Impact Properties of Vacuum-Melted Iron-Chromium Alloys. John L. Ham and Frank L. Carr. Paper from "Vacuum Metallurgy". Electrochemical Society, Inc., p. 35-48.

Compares impact properties of vacuum-melted with air-melted alloys. Charpy transition temperature and impact energy level determined for pure iron and for various iron-chromium alloys containing from 12 to 49% chromium. Graphs, tables. 12 ref. (Q6, Fe, Cr)

142-Q. Effect of Initial Structure on Development of Temper Brittleness. T. V. Sergievskaya. *Henry Brutcher Translation No.* 3597, 15 p. (From *Stal,* v. 15, no. 1, 1955, p. 63-68.) Henry Brutcher, Altadena, Calif.

Manganese steel 45G2 develops brittleness with after-temperature or with temper embrittlement at 550° C. Brittleness tendency is least in a structure of pearlite in a ferrite matrix. Tables, graphs, photographs, micrographs. 4 ref. (Q23, J29, AY)

143-Q. (French.) **A New Class of Light Materials: Semi-Products Obtained From Oxidized and Sintered Aluminum.** J. Boghen and J. Hérenguel. *Technique et science aéronautiques,* 1955, no. 5, p. 292-296.

Study of mechanical properties measured at 20° C., and their creep behavior. Graphs. 8 ref. (Q general, H general, Al)

144-Q. (German.) **Strain Hardening in Tensile Test.** Alfred Krisch. *Archiv für das Eisenhüttenwesen,* v. 26, no. 12, Dec. 1955, p. 761-767.

Investigation on different types of German steels. Micrographs, graphs, tables. 9 ref. (Q27, ST)

145-Q. (German.) **Nature and Application of Microhardness. II.** H. Bückle. *Metall,* v. 9, nos. 23-24, Dec. 1955, p. 1067-1074.

Laws of microhardness and their utilization. Graphs, diagrams, micrographs. 35 ref. (Q29)

146-Q. (Italian.) **Statistical Interpretation of Fatigue Tests.** F. Gatto. *Alluminio,* v. 24, no. 6, Nov.-Dec. 1955, p. 543-554.

Statistics applied to show applications, limitations, possible improvements. Graphs. 21 ref. (Q7)

147-Q. (Italian.) **Application of Statistical Analysis for the Interpretation of Fatigue Test Data.** F. Gatto. *Alluminio,* v. 24, no. 6, Nov.-Dec. 1955, p. 555-560.

Results show that rearrangement of points permits accurate determination of the average trend; the vertical dispersion of fatigue points appears to be of normal type and of particularly constant amplitude. Tables, graphs. (Q7)

148-Q. (Russian.) **Nature of Temper Brittleness of Steel.** A. I. Rizol', L. G. Sakvarelidze and L. M. Utevskii. *Doklady akademii nauk SSSR,* v. 105, no. 2, Nov. 11, 1955, p. 268-270 + 1 plate.

Sensitivity of steel to temper brittleness determined by solubility of carbon in ferrite in the range of 700 to 400° C., the composition and state of intercrystalline transitional zones and the size of the original austenitic grain. Micrographs. 14 ref. (Q23, ST)

149-Q. (Russian.) **Dislocation Theory of Metal Fatigue.** I. A. Oding. *Doklady akademii nauk SSSR,* v. 105, no. 6, Dec. 21, 1955, p. 1238-1240.

Decisive factor for fatigue phenomenon is intensity of formation of vacancies. Higher concentration of vacancies aggravates processes of coagulation and settling. Graph. 3 ref. (Q7, M26)

150-Q. (Russian.) **Intercrystalline Strength of Metals During Welding.** N. N. Prokhorov. *Izvestiia akademii nauk SSSR, otdelenie tekhnicheskikh nauk,* no. 11, Nov. 1955, p. 34-49.

Relation between deformation rate and plasticity of metals. Stages of fracture or failure in relation to temperature. Graphs, diagrams, micrographs. 2 ref. (Q26, Q24, K9)

151-Q. (Russian.) **Inertia of Plastic Deformation of Steel.** Ernst J. Giessmann. *Izvestiia akademii nauk SSSR, otdelenie tekhnicheskikh nauk,* no. 11, Nov. 1955, p. 50-57.

Tensile testing at high rates reveals anomalies of elongation associated with inertia of propagation of plastic deformation. Amplitudes of waves of plastic deformation of steel with and without heat treatment. Graphs, tables, diagram. 3 ref. (Q24, Q27, ST)

152-Q. (Russian.) **Local Development of Plastic Deformations in Low-Carbon Steels.** V. I. Trofimov. *Izvestiia akademii nauk SSSR, otdelenie tekhnicheskikh nauk,* no. 11, Nov. 1955, p. 58-61.

Varying character of plastic deformation in various portions of test pieces subject to tensile stress, extensions of areas affected. Table, graphs. 3 ref. (Q24, Q27, CN)

153-Q. (Russian.) **Scale Factor in Connection With Determining the Strength of Metals and the Design of Machine Parts.** G. V. Uzhik. *Izvestiia akademii nauk SSSR, otdelenie tekhnicheskikh nauk,* no. 11, Nov. 1955, p. 109-121.

Nonhomogeneity of materials is an important factor in strength of parts much larger than those of the same relative proportions tested in the laboratory. Relation of hardness, yield point and other tests of large pieces to the same tests with smaller pieces of the same proportions and material. Graphs, diagrams, tables, photograph. 17 ref. (Q23, Q29, CN, AY)

154-Q. (Russian.) **Resistance of Carbon Steels to Abrasive Wear.** A. A. Soroko-Novitskaia and M. M. Khrushchov. *Izvestiia akademii nauk SSSR, otdelenie tekhnicheskikh nauk,* no. 12, Dec. 1955, p. 35-47.

Laboratory testing methods for hardness and wear resistance of steels after various heat treatments. Effect of carbon content. Graphs, tables, diagram. 8 ref. (Q9, Q29, J general, CN)

155-Q. (Russian.) **Inverse Problems of Applied Theory of Plasticity and Carrying Capacity of Structures, the Material of Which Is Characterized by Hardening.** R. A. Mezhlumian. *Izvestiia akademii nauk SSSR, otdelenie tekhnicheskikh nauk,* no. 12, Dec. 1955, p. 80-95.

According to given deformed or stressed state, possible combinations of external loading that cause given state in the structure are determined. Stresses allowed for include bending, torsion, tangential, and others. Diagrams, graphs, tables. 13 ref. (Q24, Q25)

156-Q. (Russian.) **Mechanical Properties and Microstructure of Steels 25L and 20L in Relation to Heat Treatment.** E. P. Ivaniushin and K. N. Kulikova. *Liteinoe proizvodstvo,* no. 11, Nov. 1955, p. 1-4.

Effect of variations in annealing time and temperature. Micrographs, graphs. 8 ref. (Q general, M27, J23, CI)

157-Q. (Russian.) **Fatigue Strength of Crankshafts Made of Nodular Cast Iron and Steel, With Case-Hardened Journals.** I. V. Kudriavtsev and N. A. Balabanov. *Liteinoe proizvodstvo,* no. 11, Nov. 1955, p. 15-17.

Chemical composition of steel and of ferritic spheroidal cast irons used. Comparison of mechanical properties of crankshafts of both materials. Tables, diagrams, graphs, photographs. 6 ref. (Q7, CI, CN)

158-Q. (Russian.) **Experimental Investigation of the Strength of Equipment in Heavy Machinery Construction.** B. A. Morozov. *Vestnik mashinostroeniia,* v. 35, no. 12, Dec. 1955, p. 18-24.

Uses models of mining and metallurgical machine parts to show distribution of stresses under operational conditions. Diagrams, photographs. 4 ref. (Q25, Q23)

159-Q. (Russian.) **Change in Hardness of Friction Surface of Engine Cylinders During Breaking-In.** L. A. Dem'ianov and B. A. Kolobovnikov. *Vestnik mashinostroeniia,* v. 35, no. 12, Dec. 1955, p. 28-29.

Rate and depth of hardening, time, load, lubrication and wear factors. Relation between breaking-in rate and service life of parts. Graphs, micrograph, diagram, 3 ref. (Q29, Q9)

160-Q. (Russian.) **Abrasive Wear Resistance of Cold-Worked Metals and Alloys.** M. M. Khrushchov and M.

A. Babichev. *Vestnik mashinostroeniia,* v. 35, no. 12, Dec. 1955, p. 38-41.

Relation of hardness to plastic deformation. Test results for bronzes, steels and pure metals with and without cold working, and with variations of prior heat treatment. Relative wear resistance and hardness after heat treatment and plastic deformation.
(Q9, Q29, Q24, AY, Cu, Al, Ni)

161-Q. (Russian.) Wear Resistance After Electrospark Hardening. N. P. Pan'kov. *Vestnik mashinostroeniia,* v. 35, no. 12, Dec. 1955, p. 41-44.

Depth of surface hardened, graphite increase in surface from graphite electrode; other factors. Nature of wear and amount of protection afforded by this method. Table, graphs, photographs.
(Q9, J28, ST, CI)

162-Q. (Russian.) Study of the Mechanical Properties of Heat Treated Toolsteel. Z. M. Koniushko. *Vestnik mashinostroeniia,* v. 35, no. 12, Dec. 1955, p. 47-51.

Modulus of elasticity during tension and compression; testing methods to accommodate difficulties connected with high strength and low plasticity. Tables, diagrams, graph, photographs. 4 ref. (Q21, Q23, TS)

163-Q. (Russian.) Determination of Endurance Limit of Spring Steel When Contact Stresses are Present. A. F. Buinov, V. P. Braichev, I. G. Parkhilovskii and D. A. Sveshnikov. *Vestnik mashinostroeniia,* v. 35, no. 12, Dec. 1955, p. 51-55.

Surface condition and types of break. Relation between number of cycles and moment of tightening. Graphs, diagrams. 4 ref.
(Q7, CN, SG-b)

164-Q. Column Tests on Some Proposed Aluminium Standard Structural Sections. R. E. Smith. *Aluminium Development Association, Research Report No.* 28, Nov. 1955, 43 p.

Determination of behavior of sections when loaded in axial compression on equal and unequal bulb angles, lipped channels and lipped H-sections, for the purpose of producing more efficient aluminum designs. Diagrams, graphs, photographs, tables. 9 ref. (Q28, Al)

165-Q. Effects of Some Melting Variables on Properties of Malleable Iron. G. E. Kempka and R. W. Heine. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 19-33; disc., p. 33-34.

Experimental research results. Tables, graphs, photographs. 6 ref.
(Q27, E10, CI)

166-Q. Tensile Property Evaluation of Shell-Mold-Cast Versus Green-Sand-Cast Magnesium Alloy Test Bars. Nicholas Sheptak. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 157-162; disc., p. 162.

Includes tables, 6 ref.
(Q27, E16, Mg)

167-Q. Influence of Core Making Materials on Development of Hot Tears. C. H. Wyman. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 203-208.

Progress has been made in obtaining a design for a test casting to evaluate factors influencing hot tear formation in steel casting and in isolating certain factors contributing to the formation. These factors were inherent to specific heat cast design, to resistance of internal test cores, to pouring techniques and to metal poured. Graphs, tables.
(Q23, E21, ST)

168-Q. Metallurigical Examination of Hot Tears in Steel Castings. L. L. Clark. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 208-216.

Strongest factor to influence hot tearing is the core material. The deoxidation practice used appears to exert a definite influence on the rate of tearing. Tables, micrographs. (Q23, E general, ST)

169-Q. Pearlitic Malleable Iron—Interrelation of Heat Treatment, Mechanical Properties and Machinability. John E. Kruse. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 244-250.

Mechanical properties are dependent upon structural constitutents. A relationship between microstructure and hardness permits the prediction of mechanical properties. Oil-quenched and drawn pearlitic malleable has a higher yield strength and greater elongation than air-cooled and drawn pearlitic. Machinability appears to be a function of yield strength. Tables, graphs, micrographs. 6 ref.
(Q general, M27, G17, CI)

170-Q. Effects of Molybdenum on Stability and High-Temperature Properties of Pearlitic Malleable Iron. W. G. Scholz, D. V. Doane and G. A. Timmons. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 251-260.

Molybdenum-alloyed pearlitic malleable iron parts can function under stress at elevated temperatures appreciably higher than those practical for unalloyed iron. Micrographs, tables, graphs. (Q general, CI)

171-Q. Short-Time Elevated Temperature Properties of Three Copper-Base Casting Alloys. J. O. Edwards. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 267-269; disc., p. 269-270.

The data obtained suggest that the addition of nickel to copper-base alloys imparts improved strength at elevated temperatures. Graphs, diagram, tables. 6 ref. (Q27, Cu)

172-Q. High Temperature Impact Properties of Cast Steel. C. F. Christopher. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 480-487; disc., p. 487.

The hot tearing range in steels is dependent upon the liquidus-solidus relationship which determines the degree of heterogeneous selective freezing. Elimination of hot tearing depends on pouring temperature, which sets up a stress, and chilling, which eliminates or dissipates the stress. Photographs, tables, graphs. (Q6, CI)

173-Q. Foundry Characteristics and Properties of Magnesium Sand Casting Alloy HZ32XA. K. E. Nelson. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 596-605; disc., p. 606.

Production castings of alloy HZ32-XA were poured and tested for foundry defects. Tensile properties at room temperature and tensile and creep properties at elevated temperatures were determined. The thorium-containing alloy is inferior on the basis of castability and superior in creep resistance. Photographs, tables, graphs. 12 ref.
(Q general, E11, Mg)

174-Q. A Metallographic Study of Ruptures in Steel Castings. J. B. Caine. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 615-630; disc., p. 630-631.

Fundamental high-temperature rupture-causing processes, as an aid in diagnosing service and processing failures. Micrographs. 3 ref.
(Q26, M21, CI)

175-Q. Nickel Austenitic Ductile Irons. F. G. Sefing. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 638-641; disc., p. 641.

Physical and mechanical properties from commercial laboratory data. Micrographs, tables.
(Q general, P general, CI)

176-Q. Mechanical Properties of Cast Titanium-Silicon Alloys. H. W. Antes and R. E. Edelman. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 662-668; disc., p. 668.

Tests results for 14 alloys. Diagrams, table, graphs, photographs, micrographs. 9 ref. (Q general, Ti)

177-Q. Embrittlement, Toughening and Subcritical Thermal Treatment of Malleable Iron. G. E. Kempka. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 675-681; disc., p. 682.

Clarifies principles involved in embrittlement and its prevention, with respect to chemical composition and subcritical thermal treatment, and shows that the strength level of an iron may be raised or lowered by such treatments. Micrographs, photographs, graphs, tables. 13 ref.
(Q23, Q6, Q27, J general, CI)

178-Q. Use of Experimental Stress Analysis as a Casting Design Tool. Joe W. Beckham. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 732-735.

Use of stress data to design and redesign parts to be cast. Photographs. (Q25, E general)

179-Q. Mechanical Properties of Aluminum Alloy Castings. Roy E. Paine and W. D. Stewart. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 745-750; disc., p. 750-751.

Importance of design factors on mechanical properties obtained, relationship between mechanical properties of test bars and the actual casting, and metallurgical properties affecting mechanical properties. Diagram, graphs, tables, photographs. 6 ref. (Q general, E general, Al)

180-Q. The Tensile Strength of Brazed Stainless Steel Joints. H. A. Saller, J. T. Stacy and H. L. Klebanow. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* AECD-3696, July 1953, 15 p.

Effects of temperature, joint clearance and annealing on the tensile strength of Type 310 stainless steel T-joints brazed with 62 brazing alloys were investigated. At room temperature, joints with zero clearances were the strongest for all conditions, the strength falling off rapidly up to 0.002-in. clearance. At elevated temperatures, the tensile strengths were independent of joint clearances. Graphs, diagrams, table, micrographs. (Q27, K8, SS)

181-Q. The Application of a New Structural Index to Compare Titanium Alloys With Other Materials in Airframe Structures. L. R. Jackson and S. A. Gordon. *Battelle Memorial Institute, Titanium Metallurgical Laboratory Report No.* 24, Dec. 1955, 30 p.

Alloy comparison is on basis of ultimate tensile strength and crip-

pling strength of columns. Index is compared with room-temperature compression tests on aluminum sections and tests on titanium alloy angles and channels at room and elevated temperatures. Diagrams, graphs, tables. (Q27, Q28, Ti)

182-Q. The Wear of Cast Iron Machine Tool Slides, Shears and Guideways. H. T. Angus, D. Marles and M. H. Hillman. *British Cast Iron Research Association. Journal of Research and Development,* v. 6, Dec. 1955, p. 72-135 + 7 plates.

Results of an extensive survey of the slides of some 30 machine tools. A case history of each examination, including operating details, analysis, hardness, photographs and photomicrographs. Graph, micrographs, photographs, table. 7 ref. (Q9, CI)

183-Q. The Fracture of Brittle Chromium by Acid Etching. W. H. Smith. *Electrochemical Society, Journal,* v. 103, Jan. 1956, p. 51-53.

Hydrogen embrittlement of chromium is believed to be caused by the formation of face-centered cubic chromium hydride on the surface. Room temperature ductile material seems to show no embrittling effect. Photographs. 8 ref. (Q23, M27, Cr)

184-Q. Temperature Dependence of Hardness of the Equi-Atomic Iron Group Aluminides. J. H. Westbrook. *Electrochemical Society, Journal,* v. 103, Jan. 1945, p. 54-63.

Up to 800° C., FeAl, CoAl and NiAl-based materials show higher intrinsic hardness than pure metals. Graphs, tables, phase diagrams, micrographs. 38 ref. (Q29, Fe, Al, Co, Ni, Ti)

185-Q. Photoelasticity for Design Improvement. I. W. Smith. *Engineering Journal,* v. 39, Jan. 1956, p. 15-24; disc., p. 34-36.

Photoelastic techniques which may be used singly or in combination to solve certain stress problems not readily solved by mathematical formula. Various applications and value of the method to the design engineer. Micrographs, photographs, diagram, table. 67 ref. (Q25)

186-Q. The Effect of Irradiation on the Mechanical Properties of Arc-Melted Bureau of Mines Zirconium With Various Degrees of Cold Work. R. S. Kemper, Jr., and W. S. Kelly. *Hanford Atomic Products Operation (U. S. Atomic Energy Commission),* HW-38079 July 1955, p. 4-32.

Effects of cold working and neutron irradiation on the tensile properties and hardness of zirconium produced by the Kroll process. Irradiation increased the hardness and yield strength in annealed material but the effect decreased with increasing levels of cold work. Diagrams, tables, photographs, micrographs. 16 ref. (Q23, Q29, Zr)

187-Q. Effects of Temperature and Radiation Upon the Tensile and Impact Properties of ASTM-A302-B Manganese-Molybdenum Steel. E. E. Baldwin. *Knolls Atomic Power Laboratory (U. S. Atomic Energy Commission),* KAPL-1416, Oct. 1955. 58 p.

Tensile and impact specimens were fabricated, canned, charged into the Brookhaven reactor and irradiated to an integrated fast neutron flux of 3.7×10^{18} nvt. at 500 and 700° F. Diagrams, graphs, micrographs, tables. (Q6, Q27, Mg, Mo)

188-Q. Theory and Application of Sliding Contact of Metals in Sodium. L. F. Coffin, Jr. *Knolls Atomic Power Laboratory (U. S. Atomic Energy Commission),* KAPL-828, Oct. 1955, 17 p.

Performance of thrust-bearing combinations of various metals in liquid sodium. Mechanism of wear and surface damage. Graphs, micrographs. 5 ref. (Q9, Na)

189-Q. Failures in Titanium Parts. *Metal Industry,* v. 88, Jan. 20, 1956, p. 47-48.

Failures due to hydrogen inclusion. Results of tests to determine maximum percent of hydrogen that could be left in commercially pure titanium sheet and still avoid chances of failure of formed parts. Graphs. (Q23, Q26, Ti)

190-Q. Mechanical Strength of Thin Films of Metals. J. W. Beams, J. B. Breazeale and W. L. Bart. *Physical Review,* v. 100, ser. 2, Dec. 15, 1955, p. 1657-1661.

Films are electrodeposited on the complete cylindrical surfaces of small steel rotors and the rotor speeds necessary to throw them off are determined. The tensile strength and the adhesion of the films are obtained by using rotors of different radii. Diagrams, graphs. 13 ref. (Q27, L17, Ag)

191-Q. The Engineering Application of the Absolute Rate Theory to the Creep of Lead. Mervin B. Hogan. *University of Utah, Engineering Experiment Station, Bulletin No.* 75, v. 46, no. 17, Nov. 1955, 82 p.

Metallurgical complexity of lead and the influence of alloying elements and other factors upon its

mechanical properties. Diagrams, graphs, tables. 35 ref. (Q3, Pb)

192-Q. (French.) **Comparison of the Elastic and Mechanical Properties of Gray and Nodular Cast Irons.** Raymond de Fleury. *Fonderie,* 1955, no. 119, Dec., p. 4817-4820.

Rules and examples for calculating the modulus of elasticity of a compound in the case of a stratified or fibrous structure. Table. (Q21, CI)

193-Q. (French.) **Method and Apparatus for the Immediate Separation of Stresses in Oblique Polarized Light.** Paul Acloque. *Revue d'optique,* v. 34, no. 11, Nov. 1955, p. 553-574.

Oblique polarized light with fixed incidence provides the azimuth of the plane of incidence and the angle of incidence. These values are then used to determine principal stresses. Table, graph, diagrams, polarograms. (Q25, P17)

194-Q. (German.) **Deformation and Recrystallization Texture of Titanium and Titanium Alloys.** Konrad Sagel and Ulrich Zwicker. *Zeitschrift für Metallkunde,* v. 46, no. 12, Dec. 1955, p. 835-842.

Pressing and rolling textures. Anisotropy of mechanical and physical properties. General consideration of deformation mechanisms of hexagonal crystals. Diagrams, graphs, tables. 9 ref. (Q24, N5, Ti)

195-Q. (German.) **Change of Certain Properties of Metals and Alloys Through Cold Working. I. Hardness and Strength Change Through Cold Working.** Erich Dönnges. *Zeitschrift für Metallkunde,* v. 46, no. 12, Dec. 1955, p. 867-872.

Studies of rolling and rod drawing. Change of hardness by heat treatment after cold work. Experiments were carried out on metals and alloys with cubic crystal lattices. Graphs. 16 ref. (Q23, Q29, F23, F27, ST)

196-Q. (German.) **Nonhomogeneity of Hardness Caused by Cold Working Silver.** Albert Roll and Hasso Motz. *Zeitschrift für Metallkunde,* v. 46, no. 12, Dec. 1955, p. 872-877.

Effect of sample size and rate of application of load during hardness measurement. Effects of grain size, recrystallization texture and purity on hardness. Table, graphs. 7 ref. (Q29, N5, Ag)

197-Q. (Japanese.) **Reinforcement of Stress-Concentrated Area by Surface-Rolling Method.** Yoshio Ohashi and Shohei Murayama. *Journal of Railway Engineering Research (Japan),* v. 12, no. 18, Sept. 25, 1955, p. 437-448.

Study of fatigue limit increase by surface rolling of circular-notched specimens. Data show that the strained area does not increase in the same proportion as hardness does during rolling. Tables, graphs, diagrams, photograph, micrographs. 3 ref. (Q7, F23, CN)

198-Q. (Japanese.) **Recent Examples of Broken Rails. I.** Shigeo Ohwaku and Rikio Kurihara. *Journal of Railway Engineering Research (Japan),* v. 12, no. 20, Oct. 25, 1955, p. 511-522.

Quality tests on six types of failure of recently broken rails. Causes of failures were found and prevention measures proposed. Tables, diagrams, photographs, micrographs. (Q26, S21, ST)

199-Q. (Russian.) **Methods of Determining Plasticity and the Degree of Its Localization During Tensile Tests.** G. I. Pogodin-Alekseev. *Zavodskaia laboratoriia,* v. 21, no. 11, 1955, p. 1365-1370.

Distribution of residual deformation along length of specimen. Equations for deformation as a function of stress and distance from end of specimen. Effect of temperature. Graphs, table, diagram. 3 ref. (Q27, Q24, ST)

200-Q. (Russian.) **Tensile Testing of Metals for Boilers and Vessels by Means of Ring-Shaped Specimens.** T. A. Vladimirskii and N. V. Pashkov. *Zavodskaia laboratoriia,* v. 21, no. 11, 1955, p. 1371-1374.

Degree of deformation in stretching flat and ring-shaped specimens. Relation between yield strength and relative elongation. Tables, graphs, diagram. 6 ref. (Q27, Q23, CN)

201-Q. (Book.) **Symposium on Basic Effects of Environment on the Strength, Scaling, and Embrittlement of Metals at High Temperatures.** ASTM Special Technical Publication No. 171. 114 p. 1955. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa.

Six papers on oxidation and surface effects. (Q23, R2)

202-Q. (Book—German.) **Thermal Stresses, as a Result of Stationary Temperature Fields.** Ernst Melan and Heinz Parkus. 114 p. 1953. Springer-Verlag, Vienna, Austria.

Fundamentals of heat conductivity and thermal elasticity. Stress-free temperature fields. Thermal stresses in laminae and rotating bodies. Effects of inclusions. (Q25, Q21, P11)

203-Q. Pressure-Cabin Fatigue. P. B. Walker. *Aircraft Engineering,* v. 28, Jan. 1956, p. 11-19.

Stress pattern in a pressure cabin, fatigue loading actions and descriptions of tank testing apparatus developed for the Comet and of the Britannia tank. Photographs, diagrams. (Q7)

204-Q. On the Buckling of Oblique Plates in Shear. W. H. Wittrick. *Aircraft Engineering,* v. 28, Jan. 1956, p. 25-27.

Examination of critical shear stresses in 45° parallelogram plates showed that even for plates of practical proportions, ratio between two critical shear stresses may be of the order of 4 if edges are simply supported. Diagrams, graph, tables. 4 ref. (Q28, Q2)

205-Q. Unique Structural Problems in Supersonic Aircraft Design. F. P. Mitchell. *Aeronautical Engineering Review,* v. 15, Jan. 1956, p. 34-39.

Load distribution, wing shape, internal pressures and landing gear design, as analyzed by the structures engineer in terms of weight. Graphs, diagrams. (Q3, Q7)

206-Q. Bending and Impact Tests of Cast-Iron, Cast-Steel, and Nodular-Iron Valve Bodies. J. O. Jeffrey and R. H. Hanlon. *Mechanical Engineering,* v. 78, Jan. 1956, p. 23-27, 30.

Bending at 900° F. and drop impact tests at 40° F., conducted on standard 6-in. flanged gate valve bodies, indicated that ferritic iron valves possess sufficient shock resistance and ductility to avoid brittle fracture under these conditions. Photographs, micrographs, tables. 11 ref. (Q5, Q6, Q26, CI)

207-Q. The Adhesion of Clean Metals. F. P. Bowden and G. W. Rowe. *Royal Society, Proceedings,* v. 233, ser. A, Jan. 10, 1956, p. 429-442.

Investigation of adhesion between surfaces of hard metals cleaned by heating in a high vacuum. Low initial adhesion is due to released elastic stresses when load is removed. Application of tangential force in addition to load increases adhesion. Diagrams, graphs, table. 14 ref. (Q9, K12)

208-Q. Influence of Grinding Fluids Upon Residual Stresses in Hardened Steel. H. R. Letner. *Steel Processing,* v. 42, Jan. 1956, p. 25-29, 58.

Experiments in which air, two concentrations of rust inhibitor in water, six soluble oils and four straight grinding oils were used to show effect of grinding fluid on residual stress induced by surface grinding. Graphs, table, diagram. 8 ref. (Q25, G18, ST)

209-Q. Hot Cracking of Stainless Steel Weldments. P. P. Puzak, W. R. Apblett and W. S. Pellini. *Welding Journal,* v. 35, Jan. 1956, p. 9S-17S.

Study of weld and base-metal hot cracking in types 347 and 304 stainless steels. Tables, graphs, photographs, diagrams. 3 ref. (Q26, K9, SS)

210-Q. Stresses in Welded Pressure Vessels. W. P. Kerkhof. *Welding Journal,* v. 35, Jan. 1956, p. 41-S-59S.

Factors involved in calculating allowable stresses. Diagrams, graphs, tables. 10 ref. (Q25)

211-Q. Strain Energy Release Rate Determination for Some Perforated Structural Members. Emmet E. Day. *Welding Journal,* v. 35, Jan. 1956, p. 60S-64S.

Cast plastic Cr-39 was used for photo-elastic study of strain distribution. Energy release factors were determined and compared with theoretical values. Grapns, photographs, diagrams, 10 ref. (Q25)

212-Q. Nature of the Damping of Vibrations (in Iron and Steel). V. I. Prosvirin and N. N. Morgunova. *Henry Brutcher Translation No.* 3559, 17 p. (Abridged from *Vestnik mashinostroeniya,* v. 32, no. 5, 1952, p. 53-59.) Henry Brutcher, Altadena, Calif.

Phenomena in cast iron and carbon (0.05 to 0.92%) and austenitic steels under various heat treatments. Tables, graphs. 16 ref. (Q8, CI, AY)

213-Q. Comparison Damping Capacities of Some Steels and Cast Irons. N. N. Morgunova. *Henry Brutcher Translation No.* 3616, 7 p. (Abridged from *Vestnik mashinostroeniya,* v. 32, no. 11, 1952, p. 59-61.) Henry Brutcher, Altadena, Calif.

Relative attenuation of torsional vibration in structural steels and cast irons. Effects of heat treatment. Tables, graphs. 1 ref. (Q8, Q1, CI, Cn, AY)

214-Q. (English.) **Comparative Judgment of Materials in Relation to Their Uses.** H. Odenhausen and G. Zessler. *Acier, Stahl, Steel,* v. 20, no. 12, Dec. 1955, p. 509-515.

Establishes some main groups of judgment criteria and ascertains the result for the most important materials. Tables, graphs, photographs. (Q general, S22, ST)

215-Q. (Russian.) **Residual Stresses After Grinding of Metals.** O. G. Karpinskii and B. M. Levitskii. *Doklady akedemii nauk SSSR,* v. 106, no. 1, Jan. 1, 1956, p. 55-57.

X-ray and optical investigations of stresses of first and second orders after grinding at different speeds and in different directions. Graphs. 8 ref. (Q25, G18)

216-Q. (Russian.) **Destruction by Repeated Loading.** S. I. Ratner. *Doklady akademii nauk SSSR,* v. 106, no. 2, Jan. 11, 1956, p. 246-249.

Two conditions exist in a material during loading: decrease of fracture resistance and increase in resistance to plastic deformation. Table, graphs. 2 ref. (Q24, Q26)

217-Q. (Russian.) **Mechanical Properties of Iodide Titanium.** E. M. Savitskii, M. A. Tylkina and A. N. Turanskaia. *Doklady akademii nauk SSSR,* v. 106, no. 2, Jan. 11, 1956, p. 254-257 + 1 plate.

Strength and plasticity of wires, 3.5 to 7.5 mm. in diameter, at various temperatures and under different systems of stress conditions. Tables, graphs, photographs, micrographs. 10 ref. (Q23, Q25, Ti)

218-Q. (Russian.) **Role of Residual Stresses in Fatigue Strength of Shrink-Fitted Built-Up Rolls.** I. V. Kudriavtsev and N. M. Savvina. *Metallovedenie i obrabotka metallov,* no. 5, Nov., 1955, p. 17-23.

Surface hardening, by shot peening and other methods, to increase fatigue strength of rolls having shrunk-on sleeves. Effect of various heat treatments. Role of compressive stresses. Graphs, tables, diagram. 2 ref. (Q7, Q25, J28, ST)

219-Q. (Russian.) **Residual Stresses in Connection With Case-Hardening by High-Frequency Current.** G. F. Golovin and D. A. Kotsylo. *Metallovedenie i obrabotka metallov,* no. 5, Nov. 1955, p. 28-32.

Profile of hardness in the hardened layer. Effect of tempering variations on distribution of hardness and residual stresses. Graphs, photograph. 1 ref. (Q25, Q29, J28, J29, ST)

220-Q. (Russian.) **Properties of Industrial Forgings of Steel 20KhM.** N. I. Belan, V. V. Novikov and V. M. Kanfor. *Metallovedenie i obrabotka metallov,* no. 5, Nov. 1955, p. 33-41.

Alloy steel forgings, with cross-sections up to 145 mm., have practically no variation in creep limit, strength or hardness throughout the piece. Graphs, tables, diagrams. 5 ref. (Q3, Q23, Q29, F22, AY)

221-Q. (Russian.) **Methods for Studying Wear of Case Hardened Steel Used in Manufacture of Gears.** L. M. Fel'dman and M. A. Balter. *Zavodskaia laboratoriia,* v. 21, no. 12, 1955, p. 1501-1503.

Studies of variation in microhardness during wear. Effect of temperature and contact stresses. Graphs, diagrams, micrograph. (Q9, Q29, S1)

222-Q. (Russian.) **Attachments for Machine IM-12A for Performing Short-Time Hot Tensile and Bending Tests of Metals.** V. A. Kubasov. *Zavodskaia laboratoriia,* v. 21, no. 12, 1955, p. 1506-1507.

Description of bath for heating test specimens, a reverser for high-temperature bending tests, and a pipe-shaped electric heating furnace. Photographs, graph. 1 ref. (Q5, Q27)

223-Q. (Spanish.) **The Problem of Fatigue in Welded Construction.** Z. Garcia Martin. *Ciencia y técnica de la soldadura,* v. 5, no. 27, Nov.-Dec. 1955, p. 1-10.

Study of mechanism and avoidance of fatigue failure. Results of investigation of fatigue resistance of a Spanish structural steel under different circumstances. Diagrams, graphs, table, photographs. (Q7, ST)

224-Q. Experiment and Theory in the Investigation of the Behavior of Structures at High Temperatures. N. J. Hoff. *Aeronautical Engineering Review,* v. 15, Feb. 1956, p. 39-47.

Problems of creep, thermal stresses and buckling in consequence of creep or thermal stresses which arise from aerodynamic heating in the structural components of supersonic aircraft. Diagrams, graphs, photographs. 6 ref. (Q3, Q28)

225-Q. A Bend-Test Method of Determining the Stress Required to Cause Creep in Tension. J. B. Wachtman, Jr., and L. H. Maxwell. *ASTM Bulletin,* no. 211, Jan. 1956, p. 38-39.

Some materials require a rather well-defined stress to cause creep in tension. A method is described which permits the use of bending tests to determine this stress under conditions which make tension testing difficult. Diagrams, graphs. 4 ref. (Q3, Q27, Q5)

226-Q. Tension Testing Apparatus for the Temperature Range of −320° F. to −452° F. E. T. Wessel. *ASTM Bulletin,* no. 211, Jan. 1956, p. 40-46.

A relatively small, simple system economical to operate and capable of testing at loads to 20,000 lb. max. Photographs, table, diagram. 17 ref. (Q27)

227-Q. Relaxation of High-Tensile-Strength Steel Wire for Use in Prestressed Concrete. Garnett McLean and C. P. Siess. *ASTM Bulletin,* no. 211, Jan. 1956, p. 46-52.

Relaxation characteristics were obtained by using resonant fre-

quency measurements to determine stress variation with time. Three types of wire were tested: those straightened after drawing, but not stress-relieved; those both straightened and stress-relieved; and those not straightened, but stress-relieved. Graphs, table, diagram. 10 ref. (Q3, Q25, CN)

228-Q. An Axial Loading Creep Machine. M. H. Jones and W. F. Brown, Jr. *ASTM Bulletin,* no. 211, Jan. 1956, p. 53-59; disc., p. 60.

Factors influencing the eccentricity of loading in tension testing, and a creep machine designed to reduce bending stresses in tension creep to a minimum. Graphs, photographs, diagrams. 4 ref. (Q3)

229-Q. Residual Stresses in Welded Structures and Their Measurement. Hugh Muir and J. S. Hoggart. *Australasian Engineer,* Dec. 1955, p. 46-50.

A review of the causes of residual stresses, the factors affecting their magnitude, the likely effects of these stresses; methods available for measurement of residual stresses in welded structures. Diagrams. 7 ref. (Q25)

230-Q. Effect of Hydrogen on the Properties of Titanium and Titanium Alloys. G. A. Lenning and R. I. Jaffee. *Battelle Memorial Institute, Titanium Metallurgical Laboratory Report No.* 27, Dec. 1955, 84 p.

Surveys available research data and industrial experience on hydrogen effects. Basic considerations in the reactions are examined and correlated with steps in production, fabrication and processing to indicate the sources of hydrogen contamination. Factors affecting hydrogen embrittlement. Graphs, tables, micrographs. 35 ref. (Q general, Ti)

231-Q. The Intergranular Brittleness of Single-Phase Copper-Antimony Alloys. L. M. T. Hopkin. *Institute of Metals, Journal,* v. 84, 1955-56, p. 102-108 + 1 plate.

Impact and tensile tests were made, showing low and high-temperature embrittlement in the presence of equilibrium segregation and ductility decrease with increased antimony content. Yield points and strain aging were considered. Table, graphs, diagram, micrographs. 16 ref. (Q23, Q6, Q27, Cu, Sb)

232-Q. Rotational Slip in Zinc Single Crystals. A. D. Whapham. *Institute of Metals, Journal,* v. 84, 1955-56, p. 109-111 + 2 plates.

Single crystals were deformed by torsion about their trigonal axis and the mechanism of the deformation process investigated. Deformation mechanism was shown to be rotational slip on (0001) plane. Micrographs, photographs. 17 ref. (Q24, Zn)

233-Q. Observations on the Mechanical Properties of Two Age-Hardenable Copper-Aluminum Alloys. J. P. Dennison. *Institute of Metals, Journal,* v. 84, 1955-56, p. 115-117.

Effect of aging, at 400° C., on the mechanical properties of two alloys containing cobalt and cobalt plus nickel. The effect of cold work by cold rolling, with and without subsequent aging. Graphs, table. 2 ref. (Q general, Q24, N7, Cu, Al)

234-Q. The Contraction Ratio for Work-Hardening Materials. A. Shelton and Hugh Ford. *Iron and Steel Institute Journal,* v. 182, Feb. 1956, p. 160-168.

Tensile tests were carried out in the elastic and elastic-plastic regions of strain of a number of commonly used metals to determine the behavior of the lateral-longitudinal strain ratio. Diagrams, tables, photographs, graphs. 7 ref. (Q27, ST, Cu, Al)

235-Q. Approximate Strength of Industrial Gas Turbine Alloys Treated for Optimum Properties; Data Sheet. *Metal Progress,* v. 69, Feb. 1956, p. 80B.

Tensile, stress-rupture, and creep strengths of ten heat resisting alloys at various temperatures. Table. (Q23, Q3, Q4, SG-h)

236-Q. Russian High-Temperature Testing Techniques. (Digest of "Influence of Boundary Zones, Containing Low-Melting Components, on the Results of High-Temperature Testing of Alloys Under Various Conditions of Deformation", by A. A. Bochvar, M. E. Drits and E. S. Kadaner; *Izvestiya akademii nauk S.S.S.R., otdelenie tekhnicheskikh nauk,* no. 2, 1954, p. 42-45.) *Metal Progress,* v. 69, Feb. 1956, p. 106.

Effect of grain-boundary microconstituents on long-time high-temperature hardness and tensile-rupture strength of several magnesium alloys. Table. (Q4, Q29, Mg)

237-Q. Decomposition of Metastable Structures by Plastic Deformation. (Digest of "Effect of the Decomposition of a Solid Solution Produced by Plastic Deformation on the Mechanical Properties of an Aluminum-Copper Alloy", by V. A. Pavlov; *Doklady akademii nauk SSSR,* v. 95, 1954, p. 1201 to 1203.) *Metal Progress,* v. 69, Feb. 1956, p. 160, 162.

Previously abstracted from original. See item 656-Q, 1954.
(Q general, Al)

238-Q. Deformation Potential Theory for *n*-Type Ge. William P. Dumke. *Physical Review*, v. 101, ser. 2, Jan. 15, 1956, p. 531-536.

Deformation potential theory reexamined for electrons in germanium to take into account the ellipsoidal nature of the energy surfaces and the effect of shear wave-scattering. The coupling between shears and the conduction band energy minima is calculated from Smith's piezoresistance. Tables. 13 ref. (Q24, P15, Ge)

239-Q. On the Plastic Deformation of α-Brass Single Crystals by Compression. Hiroshi Kimura. *Physical Society of Japan, Journal*, v. 11, no. 1, Jan. 1956, p. 53-57.

Relationship between the crystallographic orientation of specimens and the easy glide examined with alpha-brass single crystals deformed by compression. Micrographic observations performed and discussed. Diagram, graphs, micrographs. 4 ref. (Q24, Q28, M26, Cu)

240-Q. How to Calculate Pipe Stresses. I. How to Use the Tabular Method. K. Hao Hsiao. *Pipe Line Industry*, v. 4, Feb. 1956, p. 20-25.

New tabulation method can save time without sacrificing accuracy in calculating stresses in three-dimensional piping systems. Tables, diagrams. (Q25)

241-Q. Nickel Bronze Powdered Metal Parts. Stanley P. Perry. *Precision Metal Molding*, v. 14, Feb. 1956, p. 63-64.

Tables of mechanical properties of test parts made of powdered nickel bronze. Tables, diagram.
(Q general, H general, Cu)

242-Q. Solid-Film Lubricants. Ralph E. Crump. *Product Engineering*, v. 27, Feb. 1956, p. 200-205.

New lubricants offer high load-carrying capacity of boundary lubricants, frictional properties of light oil and are relatively independent of temperature from −100 to 1000° F.; principal limitations are lack of heat dissipation capacity and flushing action. Diagrams, graphs, photographs, table. 7 ref. (Q9)

243-Q. Deformation and Recrystallization of Silicon Iron. George Wiener and Robert Corcoran. Paper from "Conference on Magnetism and Magnetic Materials". American Institute of Electrical Engineers, p. 112-118.

Microscopic and x-ray studies of deformation textures after 75% cold rolling. Micrographs, diagrams, tables. 6 ref. (Q24, N5, Fe-q)

244-Q. Preferred Orientations and Magnetic Properties of Rolled and Annealed Permanent Magnet Alloys. W. R. Hibbard, Jr. Paper from "Conference on Magnetism and Magnetic Materials". American Institute of Electrical Engineers, p. 184-191.

Pole figures, torque curves and coercive force have been determined for the following: Cunife, Cunico, Silmanal, Vicalloy I, Vicalloy II and Heusler's alloy. Diagrams, grapns, tables. 15 ref. (Q24, P16, SG-n)

245-Q. The Mechanical Properties Testing Program at the NBS-AEC Cryogenic Engineering Laboratory. R. H. Kropschot. Paper from "Proceedings of the 1954 Cryogenic Engineering Conference". NBS Report 3517, p. 164-169.

Testing equipment, procedures, results of tests. Table, micrographs, graphs, diagram. (Q27, Q7, Q6)

246-Q. Apparatus for Tensile Testing in the Temperature Range of 4.2 to 300° K. E. T. Wessel. Paper from "Proceedings of the 1954 Cryogenic Engineering Conference". NBS Report 3517, p. 170-178.

Equipment and procedures for both nitrogen and helium systems of testing. Graphs, diagrams. 12 ref. (Q27)

247-Q. The Compressive Strengths of Some Technical Metals Between 4.2° and 300° K. C. A. Swenson. Paper from "Proceedings of the 1954 Cryogenic Engineering Conference". NBS Report 3517, p. 179-182.

Testing apparatus and test results for hot rolled 1020 steel, a pure iron, and several stainless steels. Graphs, diagrams. 8 ref. (Q28, ST, Fe, SS)

248-Q. (Czech.) Effect of Addition of Molybdenum on the Life of Chilled Cast Iron Rolls for Hot Rolling Thin Steel Sheets. Maximilian Honzik. *Hutnické listy*, v. 10, no. 12, Dec. 1955, p. 720-725.

Addition of molybdenum over 0.30% produces an increase in resistance to thermal stresses and increased wear resistance of the hardened surface. Tables, graphs.
(Q23, T5, CI)

249-Q. (German.) Effect of Small Degrees of Deformation on the Yield Point of Cold Rolled Low Carbon Strip Steels of Deep-Drawing Quality. Fritz Fischer, Matthias Nacken and Vincenz Seul. *Stahl und Eisen*, v. 76, no. 2, Jan. 26, 1956, p. 82-90; disc. 90-93.

Materials tested, testing equipment, preparation of test pieces. Ef-

fect of different storing periods and of heat treatment after various degrees of temper rolling. Attempts to interpret behavior of yield point after slight degree of temper rolling on basis of the dislocation theory. Graphs, diagrams, table. 28 ref. (Q23, F23, ST)

250-Q. (Japanese.) **A Creep Test on a 12% Cr Heat Resisting Steel.** Takeshi Akutagawa. *Journal of Railway Engineering Research (Japan),* v. 12, no. 24, Dec. 1955, p. 607-613.

Molybdenum, tungsten, vanadium, titanium and columbium studied as alloys of 12% chromium steel. Heat treatment and alloy performances evaluated. Table, graphs, diagrams, photographs. (Q3, J general, SS)

251-Q. (Polish.) **Causes of Fractures or Damage in Rolls in Hot Sheet-Rolling Mills.** Michal Musial. *Wiadomosci hutnicze,* v. 11, no. 12, Dec. 1955, p. 380-385.

Classification of fractures according to position and direction on roll. Considers excessive pressure, fatigue, microstructural changes, surface-layer cracking, defectively made and machined rolls, and casting defects. Diagrams, micrograph. 1 ref. (Q26, Q general, F23, ST)

252-Q. (Russian.) **Long-Time Strength and Creep of Copper M1.** S. K. Maksimov. *Metallovedenie i obrabotka metallov,* no. 6, Dec. 1955, p. 21-24.

Creep strength and plastic properties of copper at high temperatures. Studies of brittle fractures at room temperature. Graphs, tables, photograph. (Q3, Q23, Q26, Cu)

253-Q. (Russian.) **Effect of Electrospark Hardening on Wear Resistance and Fatigue Strength.** G. P. Ivanov and V. P. Savukov. *Metallovedenie i obrabotka metallov,* no. 6, Dec. 1955, p. 52-56.

Effect of electrode material, electrospark methods and previous heat treatment on wear and fatigue strength of steel. Photograph, table, diagrams, graphs. 3 ref. (Q7, Q9, ST)

254-Q. Hydrogen Embrittlement in an Ultra-High-Strength 4340 Steel. E. P. Klier, B. B. Muvdi and G. Sachs. *American Institute of Mining Metallurgical and Petroleum Engineers, Preprint,* 1956, Feb. 12 p. + 15 plates.

Hydrogen embrittlement as promoted by copper plating is compared to that developed by cathodic treatment in caustic soda for 4340 steel at selected levels above 200,000 psi. tensile strength. Tables, diagrams, graphs, photographs. 8 ref. (Q23, AY)

255-Q. Stresses in Pressure Vessels. W. P. Kerkhof. *Engineers' Digest,* v. 17, Jan. 1956, p. 24-28. (From *De Ingenieur,* v. 67, no. 45, Nov. 11, 1955, p. 131W-138W; no. 46, Nov. 18, 1955, p. 141W-148W.)

Calculation of allowable stresses with consideration to weld efficiency and stress corrosion. Diagrams, graph, table. 8 ref. (To be continued.) (Q25, R1, ST)

256-Q. Irradiation of Zircaloy-2 Impact Specimens Containing Hydrogen. R. G. Wheeler and W. S. Kelly. *Hanford Atomic Products Operation (U. S. Atomic Energy Commission),* HW-39805, Nov. 2, 1955, 6 p.

Investigation to determine if Zircaloy-2 containing hydrogen in excess of 75 p.p.m. would absorb hydrogen under given conditions of irradiation at same rate as pure Zircaloy-2. Test results given for 18 specimens. Graph, table. 3 ref. (Q6, Zr)

257-Q. Presssure-Testing Cylinder Liners. F. Danson. *Gas and Oil Power,* v. 51, Feb. 1956, p. 44-45.

Design of jig for testing large cylinder liners. Diagrams, photographs. (Q23)

258-Q. Some Mechanical Properties of a Heat-Treated Aluminum-Silicon-Copper-Magnesium Casting Alloy. Harold L. Walker. *Indian Institute of Science, Journal* v. 38, sec. B, Jan. 1956, p. 4-13 + 2 plates.

The mechanical properties of ultimate tensile strength and per cent elongation in 2 in. for an alloy after heat treatment by a solid-solution treatment of heating for 12 hr. at 980° F., followed by quenching for varying times in molten salt baths at temperatures varying from 300 to 400° F., are compared to the same mechanical properties of the alloy after conventional heat treatments. Tables, micrographs. (Q general, J27, Al, Si, Cu, Mg)

259-Q. Autocorrelation Analysis of the Sliding Process. Ernest Rabinowicz. *Journal of Applied Physics,* v. 27. Feb. 1956, p. 131-135.

A simple model of the sliding process is developed in which the junctions are of the same size but have different shear strengths, and, using an artificially obtained friction trace, it is shown that the size of the junctions may be deduced through a simple autocorrelation analysis. Diagrams, graphs. 15 ref. (Q9)

260-Q. Stress Annealing in Copper Films. R. W. Hoffman and H. S.

Story. *Journal of Applied Physics,* v. 27, Feb. 1956, p. 193.

Stress annealing measurements were made on a number of copper films ranging in thickness from 900 to 1500 A. Preparation of films and stress testing procedure described. Graph. 7 ref. (Q25, J23, Cu)

261-Q. Preferred Orientations in Rolled and Annealed Titanium. J. H. Keeler and A. H. Geisler. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Feb. 1956, p. 80-90.

Preferred orientations determined by Geiger counter spectrometer X-ray diffraction technique. Five annealing textures dependent on temperature range of annealing were found. Results are examined in terms of current theories of recrystallization textures. Diagrams, tables. 27 ref. (Q24, N5, Ti, Zr)

262-Q. Creep-Rupture by Vacancy Condensation. E. S. Machlin. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Feb. 1956, p. 106-111.

Growth of pre-existent voids by vacancy condensation is highly probable. A theory of creep-rupture is presented. Tables, graphs. 18 ref. (Q3, M26)

263-Q. Tensile Deformation of Germanium Single Crystals. R. P. Carreker, Jr. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Feb. 1956, p. 111-113.

Six germanium single crystals were tested in tension in the temperature range 550 to 670° C. Plastic extension of 35% was obtained at 670° C. The flow stress of germanium is particularly sensitive to rate of straining. Diagram, graphs, micrograph. 7 ref. (Q27, Ge)

264-Q. Hot-Rolled Textures of Titanium Alloys. C. J. McHargue, J. R. Holland and J. P. Hammond. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Feb. 1956, p. 113-114.

Comparison of hot and cold rolled textures of binary alloys containing 3.8% aluminum, 14.75% zirconium and 15.4% tantalum. Table, diagrams. 5 ref. (Q24, F23, Ti)

265-Q. Mechanism of Plastic Flow in Titanium at Low and High Temperatures. F. D. Rosi, F. C. Perkins and L. L. Seigle. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Feb. 1956, p. 115-122.

Investigation of slip and twinning behavior in coarse-grained specimens or arc-melted sponge and iodide titanium extended to −196, 500 and 800° C. Micrographs, diagrams, tables. 30 ref. (Q24, Ti)

266-Q. Preferred Orientations in a Meta-Stable Body-Centered-Cubic Zr-Cb Alloy. J. H. Keeler. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Feb. 1956 p. 122-123.

Deformation and annealing textures are similar to those of other body-centered-cubic metals. Preferred orientation of the hexagonal-close packed phase is related to the parent body-centered-cubic phase by the Burgers relationship. Diagrams. 9 ref. (Q24, N5, Zr, Cb)

267-Q. Strain Rate Effects in Tungsten. James H. Bechtold. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Feb. 1956, p. 142-146.

Mechanical properties of annealed tungsten are very sensitive to strain rate in the range from 175 to 350° C. Strain rate exponent is twelve times that of steel. Zener-Hollomon parameter can be used to correlate effects of strain rate and temperature. Graphs, tables. 8 ref. (Q23, W)

268-Q. Effects of Oxygen, Nitrogen, and Carbon on the Ductility of Cast Molybdenum. L. E. Olds and G. W. P. Rengstorff. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Feb. 1956, p. 150-155.

Molybdenum ingots containing controlled amounts of a single impurity element were tested for ductility at various temperatures and the relationship between plastic behavior and chemical composition determined. Micrographs, tables, graphs. 13 ref. (Q23, Mo)

269-Q. Creep of Copper at Intermediate Temperatures. T. E. Tietz and J. E. Dorn. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Feb. 1956, p. 156-162.

Creep, at intermediate temperatures, obeys the same general laws as creep at high temperatures, but the activation differs in that it is less than that for self-diffusion. Graphs, photographs. 18 ref. (Q3, Cu)

270-Q. Mechanism of Grain Boundary Sliding. H. C. Chang and Nicholas J. Grant. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Feb. 1956, p. 169-170.

Evidence that sliding takes place by a bulk shear process. Micrographs, diagram. 9 ref. (Q24, N3, Al, Zn)

271-Q. Tensile Deformation on Molybdenum as a Function of Temperature and Strain Rate. R. P. Carreker, Jr., and R. W. Guard. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Feb. 1956, p. 178-184.

True stress-true strain data for nominally pure molybdenum as well as data on yield strength, tensile strength and percentage of elongation as a function of temperature. These were analyzed to determine effect of temperature on flow characteristics. Micrographs, table, diagrams, graphs. 15 ref. (Q27, Mo)

272-Q. Internal Friction in Zirconium. W. J. Bratina and W. C. Winegard. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Feb. 1956, p. 186-189.

Internal friction characteristics and temperature dependence of the torsion modulus for iodide zirconium, containing 2.4% hafnium, were investigated by a low frequency pendulum technique. Graphs. 10 ref. (Q22, Zr, Hf)

273-Q. Tensile Creep of High Purity Aluminum. R. W. Guard and W. R. Hibbard, Jr. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Feb. 1956. p. 195-199.

A 99.994% aluminum was tested in creep at a constant stress over a wide range of temperatures and stresses. Graphs, tables. 16 ref. (Q3, Al)

274-Q. Effect of Cooling Rate on Hardness of Commercial Titanium Alloys. Howard Martens. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Feb. 1956, p. 288.

Variation of Knoop hardness with cooling rates determined for three alloys. Graphs. 1 ref. (Q29, Ti)

275-Q. Zirconium Fatigue Tests. W. P. Wallace and R. H. Wallace. *Light Metal Age,* v. 14, Feb. 1956, p. 24-25.

Rotating beam fatigue tests on zircaloy 2 and flexure fatigue tests on sheet crystal bar zirconium. Graphs, diagram, micrograph. (Q7, Zr)

276-Q. Wear Studies With Radioactive Gears. V. N. Borsoff. *Lubrication Engineering,* v. 12, Jan.-Feb., 1956, p. 24-27; disc., 27-28.

Radio-active techniques used to detect and measure gear wear, revealing three types: scoring, abrasion and chemical corrosion. Wear behavior of various lubricants; metal transfer studies. Diagram, photograph, graphs, radiographs. 1 ref. (Q9, R1)

277-Q. A Study of Fretting Wear in Mineral Oil. D. Godfrey. *Lubrication Engineering,* v. 12, Jan.-Feb., 1956. p. 37-41; disc., p. 41-42.

Factors involved in lubricated fretting determined by experiments in mineral oil under carefully controlled conditions. Tests with initially unlubricated specimens show marked effect of humidity. Graphs, diagrams, table. 6 ref. (Q9)

278-Q. A Study of the Sliding of Metals, With Particular Reference to Atmosphere. L. F. Coffin, Jr. *Lubrication Engineering,* v. 12, Jan.-Feb., 1956, p. 50-58; disc., p. 58-59.

Comparative friction behavior of 75 couples and the role of atmosphere in the sliding process. Alloying ability serves as a qualitative criterion for local seizure and surface damage. Graphs, micrographs, tables, diagram. 14 ref. (Q9)

279-Q. The Tensile Properties of Single Crystals of High-Purity Iron at Temperatures From 100 to −253° C. N. P. Allen, B. E. Hopkins, and J. E. McLennan. *Royal Society, Proceedings,* v. 234, ser. A, Feb. 7, 1956, p. 221-246 + 1 plate.

Deformation and fracture characteristics of single crystals of high-purity iron of various orientations when tested in tension at temperatures from 100 to −253° C. Graphs, diagrams, tables, micrographs. 23 ref. (Q27, Fe)

280-Q. What to Do About Sucker Rod Failures. A. A. Hardy. *World Oil,* v. 142, Feb. 1956, p. 129-132

Improved field techniques and thread design resulting in close fit of the threaded connections should minimize fatigue failures. Table, diagrams, photograph. 6 ref. (Q7, ST)

281-Q. (German.) Contribution to Measurement of Elastic Modulus and Attenuation of Sintered Materials. R. Palme and W. Scheiber. *Planseeberichte für Pulvermetallurgie,* v. 3, no. 3, Dec. 1955, p. 87-95.

Improved arrangement for E-modulus determination on samples of alloyed and unalloyed sinter-iron. Tables, graphs. 8 ref. (Q21, H15, Fe)

282-Q. (Russian.) High-Strength Cast-Iron as a Substitute for Steel in the Manufacture of Certain Cast Parts of Peat Machines. B. T. Kozhevnikov. *Torfianaia promyshlennost'*, v. 32, no. 8, 1955, p. 21-22.

Yield strength, hardness and other properties of high-strength cast-iron specimens without heat treatment and with variations of heat treatments. Tables, photographs, micrographs. (Q23, Q29, T29, CI-c)

283-Q. (Book.) Elevated Temperature Properties of Carbon Steels. Ward F. Simmons and Howard C. Cross. 63 p. 1955. American Society for Testing Materials, 1916 Race Street, Philadelphia 3, Pa.

Graphical summary of data. Graphs, tables. (Q general, CN)

284-Q. A Non-Destructive Test for Bore Hardness. David E. Driscoll and Samuel J. Acquaviva. *American Machinist*, v. 100, Feb. 27, 1956, p. 116-117.

Measurement of the bore hardness of a tube by a nondestructive method (including both standard tubing in industry and gun tubes in the Armed Forces). Photographs, diagrams, graph. (Q29, Be, Cu)

285-Q. Investigations Into Blade-Root Fixings of High-Temperature Steels. W. Siegfried. *ASME, Transactions*, v. 78, Feb. 1956, p. 327-338.

Investigations comprised long-time tests on smooth and notched specimens and on various models of blade-root fixings. Results were explained on the basis of a working hypothesis which conforms to Ludwick's theory of the embrittlement of materials at room temperature. Graphs, diagrams, photographs, tables. 4 ref. (Q3, Q23, Q26, ST)

286-Q. Factors Influencing the Notch Fatigue Strengthening of N-155 Alloy at Elevated Temperatures. W. S. Hyler and W. F. Simmons. *ASME, Transactions*, v. 78, Feb. 1956, p. 339-347; disc., p. 347-348.

Data illustrate effect of stress raisers on the elevated-temperature fatigue behavior of N-155 alloy. Data were obtained on specimens notched with V-grooves having various root radii and various notch severities. The experimental program was in direct-stress fatigue and covered a range of alternating stress to mean stress from $A = 0.0$ to $A = \infty$ at temperatures of 1200 to 1500° F. Diagrams, micrographs, graphs, tables. 11 ref. (Q7, SG-h)

287-Q. Factors Influencing the Notch-Rupture Strength of Heat-Resistant Alloys at Elevated Temperatures. R. L. Carlson, R. J. MacDonald and W. F. Simmons. *ASME, Transactions*, v. 78, Feb. 1956, p. 349-358.

Stress-rupture tests were conducted on notched and unnotched or plain bars of S-816, Inconel "X" Type 550, and Waspaloy, at temperatures ranging from 1200 to 1600° F. Test objectives were to learn under what conditions these materials respond in a brittle manner and to study factors having influence in notched and unnotched stress-rupture behavior. Diagram, graphs, micrographs, tables. 5 ref. (Q4, SG-h)

288-Q. Plasticity Equations and Their Application to Working of Metals in the Work-Hardening Range. E. G. Thomsen. *ASME, Transactions*, v. 78, Feb. 1956, p. 407-412.

Reviews equations applicable to general states of stress in forming problems. Theoretical solutions for the particular case of cold extruding 2S-O aluminum in an inverted extrusion process with negligible external friction are compared with experimental results. Graphs, table. 17 ref. (Q24, G5)

289-Q. Plastic Metalworking. E. V. Crane. *ASME, Transactions*, v. 78, Feb. 1956, p. 413-415.

Objective is to stimulate analytical thinking, coordinate it with practice and present it in usable form for the man in the field. Diagrams, photograph. 6 ref. (Q24, F general, G general)

290-Q. A Photographic Method of Obtaining Stress Trajectories. A. R. Morris. *British Journal of Applied Physics*, v. 7, Feb. 1956, p. 59-61.

Method of superimposing a set of photographs of isoclinics described. Use of grid enables stress trajectories to be easily and accurately drawn. Photographs, diagram. 3 ref. (Q25)

291-Q. The Effects of Phosphorus in Magnesium-Treated Cast Iron. K. I. Vaschenko and L. Sofroni. *Engineers' Digest*, v. 17, Feb. 1956, p. 56-58. (From *Liteinoe proizvodstvo*, 1955, no. 7, 1955, p. 12-17.)

In malleable cast iron, the phosphorus content should not exceed 0.18 to 0.20%. Collective data on the effects of phosphorus on the change in mechanical properties of magnesium - treated cast irons. Graphs, table. (Q general, CI)

292-Q. Stresses in Pressure Vessels. W. P. Kerkhof. *Engineers' Digest*,

v. 17, Feb. 1956, p. 65-68. (From *De Ingenieur*, v. 67, no. 45, Nov. 11, 1955, p. W.131-W.138, and no. 46, Nov. 18, 1955, p. W.141-W.148.)

Weld defects and their influence on strength, calculation of allowable stress ranges. (To be concluded.) (Q25, Q26, K1)

293-Q. The Determination of Temperature, Stresses, and Deflections in Two-Dimensional Thermoelastic Problems. Bruno A. Boley. *Journal of the Aeronautical Sciences*, v. 23, Jan. 1956, p. 67-75.

Investigations concerning thermal stresses in plates. An analytical successive-approximation method for the solution of linear partial differential equations is presented in general terms, and then applied to the solution of two-dimensional heat and thermal stress problems. Graphs, tables. 14 ref. (Q25)

294-Q. Dependence of Young's Modulus and Internal Friction of Copper Upon Neutron Bombardment. Donald O. Thompson and David K. Holmes. *Journal of Applied Physics*, v. 27, Feb. 1956, p. 191-192.

The results of measurements of the "saturation" changes in Young's modulus and the internal friction of copper single crystals accompanying fast neutron irradiation were reported. The functional dependence of these properties on neutron bombardment has been obtained. Graph. 5 ref. (Q21, Q22, Cu)

295-Q. Dynamic Loading of Rigid-Plastic Cylindrical Shells. G. Eason and R. T. Shield. *Journal of the Mechanics and Physics of Solids*, v. 4, Feb. 1956, p. 53-71.

Loads are assumed to be greater than static collapse values and to act for a short period of time. Numercial values are obtained for rectangular and triangular pulse shapes for a ring of force and for a rectangular pulse shape for a band of uniform pressure. Graphs, diagrams. 8 ref. (Q25)

296-Q. An Experimental Study on the Fracture of Metals Under Hydrostatic Pressure. L. W. Hu. *Journal of the Mechanics and Physics of Solids*, v. 4, Feb. 1956, p. 96-103.

Experimental investigation on plastic behavior of aluminum alloy Alcoa 61S-T6 subjected to tri-axial stresses showed that fracture strength was not affected by hydrostatic pressure, but ductility decreased as hydrostatic pressure increased. Diagrams, table, graphs. 7 ref. (Q26, Al)

297-Q. Yielding in Compression of Strip Between Smooth Dies. B. B. Muvdi and K. N. Tong. *Journal of the Mechanics and Physics of Solids*, v. 4, Feb. 1956, p. 121-127.

Yielding loads determined experimentally compared with those from analysis based upon plastic-rigid theory of plasticity. Graphs, diagrams. 7 ref. (Q28, Q23, G1, ST)

298-Q. Initial Plastic Yielding in Notch Bend Tests. A. P. Green and B. B. Hundy. *Journal of the Mechanics and Physics of Solids*, v. 4, Feb. 1956, p. 128-144 + 6 plates.

Theoretical plane-strain solutions are presented for initial plastic yielding of notched bars bent either under four-point loading or as in the Izod or Charpy tests, and having either a V-notch or a notch whose root is a circular arc. Diagrams, graphs, photographs, tables. 13 ref. (Q5, Q23, ST)

299-Q. Use of Radio-Isotopes for Measuring Tool Wear in Metal Cutting. Robert T. Hook. *Machinery, (London)*, v. 88, Feb. 10, 1956, p. 245-248.

Establishment and operation of nuclear energy laboratory for testing cutting tool materials. Photographs, graph. (Q9, G17, S19)

300-Q. Nomographs for Calculating Hot-Air Contamination of Commercial Titanium and Titanium Alloys. J. E. Reynolds, H. R. Ogden and R. I. Jaffee. *Materials & Methods*, v. 43, Feb. 1956, p. 139, 141.

Hardness charts were constructed from experimental diffusion studies. They apply to conditions in which contamination does not extend throughout the section involved. (Q29, N1, Ti)

301-Q. Aluminium-Copper-Cadmium Alloys. E. A. G. Liddiard and H. K. Hardy. *Metal Treatment and Drop Forging*, v. 23, Feb. 1956, p. 67-71.

Properties outlined and comparison made with other aluminum-copper alloys. Graphs, tables, photograph. (Q23, Q29, Al, Cu, Cd)

302-Q. A Machine For Bend Tests. M. J. W. Geenen. *Philips Technical Review*, v. 17, Mar. 1956, p. 246-248.

Design of special bending machine for testing sheet and strip metal. Other bending methods are discussed. Diagrams, photograph. (Q6)

303-Q. The Origin of Fatigue Fracture in Copper. N. Thompson, N. Wadsworth and N. Louat. *Philosophical Magazine*, v. 1, 8th ser., no. 2, Feb. 1956, p. 113-126.

Polycrystal and single crystal specimens were tested in push-pull at 1000 cycles per sec. It was shown

that the fatigue crack started in a slip band inside a single grain. An electropolishing technique showed changes in the character of the slip band after 5% of the life had expired. Diagram, graph, table. 10 ref. (Q7, Cu)

304-Q. The Ductile Fracture of Polycrystalline α-Iron. N. J. Petch. *Philosophical Magazine,* v. 1, 8th ser., no. 2, Feb. 1956, p. 186-190.

Evidence that ductile fracture requires a compressive stress on the dislocation arrays close in value to that required for cleavage. Graph. 6 ref. (Q26, Q23, Fe)

305-Q. Hypo-Elasticity and Plasticity. A. E. Green. *Royal Society, Proceedings,* v. 234, ser. A, Jan. 24, 1956, p. 46-59.

A general theory of work hardening incompressible plastic materials is developed as a special case of Truesdell's theory of hypo-elasticity. 16 ref. (Q21, Q23)

306-Q. Stress Gradients in Grooved Bars and Shafts. M. M. Leven. *Society for Experimental Stress Analysis, Proceedings,* v. 13, no. 1, 1955, p. 207-213.

Major stress across the transverse section of symmetry was calculated for the cases of flat bars and shafts containing infinitely deep hyperbolic notches subjected to tension, bending, or torsion, based on Neuber's equations. Graphs, diagrams. 9 ref. (Q25)

307-Q. The Behavior of Spot Welds Under Stress. John F. Rudy, Roy B. McCauley and Robert S. Green. *Welding Journal,* v. 35, Feb. 1956, p. 65S-71S.

Relationship shown to exist between these four spot-welding parameters: failure system, weld strength, macro-geometry of cross section, and sectioned spot shear test observations. Table, diagrams, micrographs, photographs, graphs. (Q23, K3)

308-Q. The Effect of Microstructure on Notch Toughness. III. J. H. Gross and R. D. Stout. *Welding Journal,* v. 35, Feb. 1956, p. 72S-76S.

Investigation covers the notch toughness of pearlite and ferrite aggregates in a fine-grained plain carbon steel. Tables, photograph, graph, micrographs. 8 ref. (Q23, M27, CN)

309-Q. The Effect of Microstructure on the Morphology of Fracture. II. J. C. Danko and R. D. Stout. *Welding Journal,* v. 35, Feb. 1956, p. 77S-81S.

Fracture morphology investigation of a 1025 steel reveals that fracture is associated with ferrite grain boundaries and the pearlite-ferrite interfaces which are subjected to large amounts of plastic deformation. Micrographs, tables, graphs. 17 ref. (Q26, CN)

310-Q. Dependence of Steel Weld Properties on Lattice Structure. J. Heuschkel. *Welding Journal,* v. 35, Feb. 1956, p. 82S-90S.

Temperature dependence found to be different for plain low-carbon and austenitic chromium-nickel steel weld metals, being primarily influenced by the inherent lattice structure. Tables, graphs. 18 ref. (Q23, M26, K1, Cr, Ni, ST)

311-Q. Tensile-Impact Properties of Commercially Pure Titanium at Various Temperatures. O. H. Henry and B. Z. Hyatt. *Welding Journal,* v. 35, Feb. 1956, p. 99S-101S.

Welded and nonwelded specimens tested at −65, 70, and 600° F. to determine tension-impact energy, elongation, and reduction in cross-sectional area. Photograph, diagram, table. (Q6, Q27, Ti)

312-Q. Resistance of Low-Alloy Steel Plates to Biaxial Fatigue. C. E. Bowman and T. J. Dolan. *Welding Journal,* v. 35, Feb. 1956, p. 102S-109S.

The relative resistance to repeated loading of several low-alloy steels and a carbon steel are compared. Effect of notches and welds upon the fatigue properties of each material is reported. Tables, diagram, photographs, graphs. 12 ref. (Q7, ST)

313-Q. The Mechanical Properties of Quenched and Tempered Medium-Carbon Alloy Steels. J. W. Lodge and G. K. Manning. *American Iron and Steel Institute, Contributions to the Metallurgy of Steel,* no. 49, Mar. 1956, 66 p.

Results of a number of precision tests made to determine the mechanical properties of fully quenched and tempered steels. The primary purpose of investigation was to determine the effects of incomplete hardening or slack quenching on the mechanical properties of the steels. Tables, micrographs, graphs. (Q general, ST)

314-Q. Useful Friction Recorder. Philip F. Kurz. *American Journal of Physics,* v. 24, Mar. 1956, p. 174-175.

Simple and flexible apparatus for recording frictional forces and changes in such forces encountered in traversing plane surfaces. Examples of typical records. Diagrams. (Q9)

315-Q. Researches on Fatigue of Metals at Mechanical Engineering Re-

search Laboratory. East Kilbride and C. E. Phillips. *Institution of Engineers & Shipbuilders in Scotland, Transactions,* v. 99, pt. 3, 1955-56, p. 173-192.

Review of recent research on pin joints, screw threads, effect of size of specimen, propagation of fatigue cracks and low endurance fatigue. Graphs, diagram, micrographs, photograph, table. 9 ref. (Q7, ST, SS, Al, Mg)

316-Q. Can Specimen Size Affect Tensile Testing? Edward Dugger and Alton Brisbane. *Iron Age,* v. 177, Mar. 22, 1956, p. 82-85.

Little effect is shown by unnotched specimens but notched specimens show anomalous results. Tables, diagram, graphs. (Q27)

317-Q. Bending Creep and Its Application to Beam-Columns. L. W. Hu and N. H. Triner. *Journal of Applied Mechanics,* v. 23, Mar. 1956, p. 35-42.

Procedure for evaluating creep deflection of members subjected to bending moment. Creep behavior of beam-columns of magnesium alloy FSl-F at 260° F. investigated, results compared satisfactorily with theoretical prediction. Graphs, photographs, diagrams. 10 ref. (Q5, Q3, Mg)

318-Q. Combined Stress Tests in Plasticity. Aris Phillips and Lloyd Kaechele. *Journal of Applied Mechanics,* v. 23, Mar. 1956, p. 43-48.

Tests were made on thin-walled tubes of aluminum 2S-O to get information on the validity of the incremental theories of plasticity. Results favor the theories. Graphs. 10 ref. (Q27, Al)

319-Q. The Pattern of Plastic Deformation in a Deeply Notched Bar With Semicircular Roots. L. Garr, E. H. Lee and A. J. Wang. *Journal of Applied Mechanics,* v. 23, Mar. 1956, p. 56-58.

Graphical step-by-step method is used to determine deformation of a square grid scribed on the undeformed cross section. The deformed pattern details the regions of large plastic strain and may prove useful in considering initiation of fracture cracks. Graphs, diagrams. 7 ref. (Q24)

320-Q. Stress Concentration Caused by Multiple Punches and Cracks. Michael Sadowsky. *Journal of Applied Mechanics,* v. 23, Mar. 1956, p. 80-84.

General theory of stress distribution under several punches in simultaneous action, and of stress concentration caused by several cracks; complete evaluation for case of two punches or two cracks. Graphs, diagrams. 10 ref. (Q25, Q26, Q2)

321-Q. The Stress Distribution in a Strip Loaded in Tension by Means of a Central Pin. P. S. Theocaris. *Journal of Applied Mechanics,* v. 23, Mar. 1956, p. 85-90.

Exact solution for stress distribution resulting from loading a perforated strip in tension through a rigid pin filling the hole. Influence of hole size on stress concentration. Tables, graphs. 8 ref. (Q25, Q27)

322-Q. Studies in Dynamic Photoelasticity. M. M. Frocht and P. D. Flynn. *Journal of Applied Mechanics,* v. 23, Mar. 1956, p. 116-122.

Equipment and technique for obtaining dynamic photoelastic stress patterns from arbitrary lines in plane-stress systems by means of streak photography. Photographs, diagrams, graph, table. 16 ref. (Q25)

323-Q. Properties of Gray Iron. *Materials & Methods,* v. 43, Mar. 1956, p. 141, 143.

Data on iron of classes 20, 25, 30, 35, 40, 50 and 60. (Q general, P10, CI)

324-Q. Russian Theory for Creep Fracture. (Digest of "Fracture of Metals During Creep", by V. S. Ivanova; *Metallovedenie i obrabotka metallov,* 1955, no. 1, p. 19-26; and by I. A. Oding and V. S. Ivanova, *Doklady akademii nauk SSSR,* v. 103, 1955, p. 77-80.) *Metal Progress,* v. 69, Mar. 1956, p. 158, 160, 162.

Previously abstracted from original. See items 887-Q, 1955; 21-Q, 1956. (Q3, Q26, Ni, ST)

325-Q. The Elastic Coefficients of the Cubic System With Tables for Simplified Calculation. Hans H. Stadelmaier, W. Maurice Pritchard and John E. Grund. *North Carolina State College (Engineering School Bulletin, Industrial Information Series Bulletin no.* 60), Oct. 1955, 9 p.

Tables at 5° intervals simplify application of elastic theory of anisotropic materials. 1 ref. (Q21)

326-Q. The Tensile Properties of Zirconium at Elevated Temperatures. D. R. Brunstetter, H. P. Kling and B. H. Alexander. *Sylvania Electric Products, Inc. (U. S. Atomic Energy Commission),* NYO-1126, Apr. 1950, 18 p.

Values of yield strength, tensile strength, elongation and Young's modulus determined on 0.015 in. diam. zirconium wire at temperatures ranging from 70 to 1000° F. Diagram, graphs, tables. 2 ref. (Q23, Q21, Zr)

327-Q. The Performance of High-Strength Pressure-Vessel Steels. J. H. Gross and R. D. Stout. *Welding Journal,* v. 35, Mar. 1956, p. 115s-119s.

Six representative high-strength steels given extensive mechanical tests to aid in determining their applicability to pressure vessels. They are found to compare favorably with the conventional, plain carbon A201 steel. Graphs, tables. 8 ref. (Q general, ST)

328-Q. V-Notch Charpy Impact Testing of Weld Metal and Heat-Affected Zone Simultaneously. William P. Hatch, Jr., and Carl E. Hartbower. *Welding Journal,* v. 35, Mar. 1956, p. 120s-126s.

Composite test provides, at least in part, a method for evaluating the relative notch-toughness characteristics of weld metal and heat-affected base metal in a natural environment. Table, graphs, diagrams. (Q6)

329-Q. (English.) **On the Characteristic of the Weakening Effect.** Mizuho Sato. *Arkiv för Fysik,* v. 10, no. 1, 1956, p. 37-44.

The weakening effect on solid bodies due to wetting by liquids and the characteristics of this remarkable effect. Graphs, diagram. 8 ref. (Q general)

330-Q. (English.) **The Wetting Effect on Quenched Carbon Steel Within Its Elastic Limit.** Mizuho Sato. *Arkiv för Fysik,* v. 10, no 1, 1956, p. 45-48.

The change in Young's modulus of a quenched carbon steel, due to wetting by several liquids, is studied experimentally. The order of magnitude of this change is the same as that observed by Benedicks in his bending tensile test. Table, graph. 4 ref. (Q21, CN)

331-Q. (English.) **Finite Torsion of Aelotropic and Composite Cylinders. I.** J. Ramakanth. *Zeitschrift fur Angewandt Mathematik und Mechanik,* v. 35, no. 12, Dec. 1955, p. 453-459.

Application of B.R. Seth's method to obtain values for the torsion of isotropic hollow cylinders and hexaganol aelotropic cylinders. Numerical results compared with those obtained by theory of the infinitely small compulsion. Tables. 3 ref. (Q1)

332-Q. (Czech.) **Use of Radiographic Measurements, of Internal Stresses in the Strength Calculation of Structures.** Miroslav Cermak. *Hutnické listy,* v. 11, no. 1, Jan. 1956, p. 21-27.

Brandenberg elasticity and strength theory of radiometric stress measuring permits measurement of real stress values. Graphs, diagrams. (Q25)

333-Q. (French.) **Fatigue Strength of Machine Parts.** R. Cazaud. *Metaux, Corrosion-Industries,* v. 31, no. 365, Jan. 1956, p. 1-17.

Endurance limits of steels and alloys, influence of transformation conditions, effect of size and shape, surface state, temperature, and corrosion. Graphs, tables, photographs. 23 ref. (Q7, ST)

334-Q. (French.) **Influence of Structure on the Mechanical Properties and Conditions of Anodic Oxidation of Oxidized and Sintered Aluminum By-Products.** J. Boghen and J. Hérenguel. *Revue de l'Aluminium,* v. 32, no. 227, Dec. 1955, p. 1117-1124; disc., p. 1124.

Properties and creep resistance of oxidized sintered aluminium semi-finished products are primarily influenced by their structure. Effect on tensile strength, proof stress and hardness increase, as well as creep resistance, as the powder thickness lessens. Graphs, micrographs. 13 ref. (Q general, A1)

335-Q. (German.) **Creep Law of Multicrystalline Metals.** U. Dehlinger, J. Diehl and J. Meissner. *Zeitschrift für Naturforschung,* v. 11a, no. 1, Jan. 1956, p. 37-41.

General linear law of the speed of plastic deformation and relationship between stress and elongation. Experimental proofs by tension-torsion tests with arbitrary rotation of axis of the stress tensor. Graphs. 12 ref. (Q3)

336-Q. (Polish.) **Effect of Alloy Additions on the Properties of Patented Steel Wire.** Zygmunt Steininger. *Hutnik,* v. 22, no. 9, Sept. 1955, p. 306-313.

Effect of various elements and gases, patenting temperature, and other factors on curves of isothermal transformation of austenite. Bainitic-ferritic, pearlitic, and other structures. Micrographs, graphs. 6 ref. (Q general, N8, J25, CN)

337-Q. (Polish.) **Use of Spheroidal Cast Iron as a Wear-Resistant Material.** Mieczyslaw Pachowski. *Przeglad odlewnictwa,* v. 6, no. 1, Jan. 1956, p. 10-12.

Economy of using spheroidal cast iron for rams and crushing hammers, and its wear-resistance, as compared with manganese cast steel. Table, graphs, diagrams. 3 ref. (Q9, T28, CI)

338-Q. (Russian.) **Problem of the Constants of Elasticity and the Coeffi-**

cient of Lateral Deformation. Calculation of Large Deformations. G. P. Zaitsev. *Fizika metallov i metallovedenie,* v. 1, no. 2, 1955, p. 193-205.

A new constant of elasticity, independent of the magnitude of elastic deformation is proposed which establishes a coefficient of lateral deformation for elastic, plastic and elastoplastic deformations. Graphs, tables. 12 ref. (Q21, Q24)

339-Q. (Russian.) **Absorption of Energy at Low-Temperature Deformation of Metals.** V. I. Khotkevich, E. F. Chaikovskii and V. V. Zashkvara. *Fizika metallov i metallovedenie,* v. 1, no. 2, 1955, p. 206-218.

Impulse method of microcalorimetric measurements developed for studying the concealed energy of deformation of metals plastically deformed at 77° K. Relation of concealed energy of deformation to resistivity and other factors. Photographs, graphs, diagrams. 13 ref. (Q24, Cd, Pb)

340-Q. (Russian.) **Study of Cold Brittleness of Iron and Steel in Relation to Grain Size and Chemical Composition.** E. M. Shevandin and I. A. Razov. *Fizika metallov i metallovedenie,* v. 1, no. 2, 1955, p. 219-230.

Various heat treated specimens tested for mechanical properties to clarify the relation of temperature coefficient of plasticity to grain size, of change in creep limit to change in plasticity, with decrease of temperature, and of hardening coefficient to plasticity. Tables, graphs, diagrams. 16 ref. (Q23, ST, AY)

341-Q. (Russian.) **Irreversible Temper Brittleness of Structural Alloy Steels.** E. N. Sokolkov and V. D. Sadovskii. *Fizika metallov i metallovedenie,* v. 1, no. 2, 1955, p. 359-361.

Variation of hardness, impact toughness, intensity of magnetization and growth of coercive force at the Curie point of the magnetic phase, in relation to tempering temperatures. Graphs. 7 ref. (Q23, P16, J29, AY)

342-Q. (Russian.) **Effect of Deoxidation by Aluminum on the Irreversible Temper Brittleness of Structural Alloy Steels.** E. N. Sokolkov, G. V. Gaidukov and V. D. Sadovskii. *Fizika Metallov i Metallovedenie,* v. 1, no. 2, 1955, p. 366-367.

Relation of impact toughness to tempering temperature, with various aluminum additions. Graphs. 4 ref. (Q23, J29, AY, Al)

343-Q. (Russian.) **Relation Between Intensity of Stresses and Intensity of Deformations for Certain Metastable Alloys.** T. N. Martynova. *Moskovskoga universiteta, vestnik, seriia fiziko-matematicheskikh i estestvennykh nauk,* v. 10, no. 12, Dec. 1955, p. 29-36.

Experimental results render more precise the law of hardening, in the theory of small elasto-plastic deformations. Mechanical properties, including hardness, of aluminum, magnesium, and toolsteel specimens, subjected to compression, tension and torsion tests. Table, graphs. 7 ref. (Q general, Al, Mg, TS)

344-Q. (Russian.) **More on the Problem of the Cylindrical Form of the Loss of Stability of Elastoplastic Sheets.** Iu. R. Lepik. *Prikladnaia Matematika i Mekhanika,* v. 20, no. 1, Jan.-Feb. 1956, p. 140-143.

Equations for theory of loss of bearing capacity in flat sheets or bars stressed beyond the elastic limit. Mechanism and forms of curling, sagging and buckling. Graphs. 7 ref. (Q28, Q21)

345-Q. (Russian.) **Conditions Under Which Fibrous Fracture Occurs in Steels.** N. K. Ipatov. *Stal',* v. 16, no. 1, Jan. 1956, p. 51-53.

Attempts to identify the causative mechanism of the fractures by testing various heat treated specimens, representing an extremely broad range of microstructures. Micrographs. (Q26, J general, M27, ST)

346-Q. (Russian.) **Test Results, Under Actual Use Conditions, for a New Antifriction Alloy, SOS6-6.** A. V. Lakedemonskii, V. B. Pogozhev, N. M. Rudnitskii and I. E. Fokin. *Vestnik mashinostroeniia,* v. 36, no. 1, Jan. 1956, p. 55-56.

New alloy is considered better for bearings, under high speed and pressure conditions in gasoline engines, than high-tin or lead babbitt metal. Composition, physical properties, microstructure and economy of this alloy. Photograph, micrograph, table. (Q9, Q general, Pb)

347-Q. (Russian.) **Problem of Wear Resistance and Hardness of Electro-Chromium Coatings.** A. V. Shreider. *Zhurnal Prikladnoi Khimii,* v. 29, no. 1, Jan. 1956, p. 73-82.

Hardness and wear-resistance indicators for chromium platings determined; peculiarities in relation to hardness and wear resistance explained. Microhardness method suggested as a quick way of determining wear resistance. Graphs, diagram. 20 ref. (Q29, Q9, Cr)

348-Q. Developments in Fatigue Crack Detecting Systems. S. R. Val-

luri. *California Institute of Technology, Southern California Cooperative Wind Tunnel Report No. P-5,* July 1955, 26 p.

Investigation of reliability of the wire type system. Basic principles of propagation of a fatigue crack; surface, wire and adhesive used to attach wire to surface; installation techniques, equipment and location of failures. Tables, graphs, photographs, diagram. 13 ref. (Q7, W, Cu, Ni)

349-Q. Effect of Carbide-Forming Elements on Temper Embrittlement of Steel. V. I. Prosvirin and E. I. Kvashnina. *Henry Brutcher Translation No.* 3560, 20 p. (From *Vestnik Mashinostroeniya,* v. 35, no. 2, 1955, p. 58-67.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 421-Q, 1955. (Q23, M26, ST)

350-Q. Nitrogen-Alloyed High-Chromium Steels. A. Semkowicz. *Henry Brutcher Translation No.* 3626, 7 p. (Abridged from *Hutnik,* v. 22, no. 1, 1955, p. 8-12.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 604-Q, 1955. (Q23, Q29, J general, R general, AY)

351-Q. Effect of Plastic Deformation in the Austenitic State Upon Temper Embrittlement of Alloy Structural Steels. L. V. Smirnov, E. I. Sokolov and V. D. Sadovskii. *Henry Brutcher Translation No.* 3672, 4 p. (From *Doklady Akademii Nauk SSSR,* v. 103 no. 4, 1955, p. 609-610.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 1038-Q, 1955. (Q24, Q25, ST)

352-Q. (French.) **Deformation Mechanics in Metals.** L. Habraken and T. Greday. *Revue Universelle des Mines,* v. 12, ser. 9, no. 2, Feb. 1956, p. 38-55.

Present status of physical metallurgy in the field of metal deformation, based on various X-ray and microscopic studies. Essential differences between the behavior of monocrystals and polycrystalline aggregates. Theoretical interpretation of deformation within the theory of dislocations. Diagrams, tables, photographs, graphs, micrographs. 50 ref. (Q24)

353-Q. (German.) **Further Foreign Investigations and Considerations of Brittleness of Steel.** Karl Rühl. *Archiv für das Eisenhüttenwesen,* v. 27, no. 2, Feb. 1956, p. 107-118.

Review of foreign literature. Outline for construction of a theory on the subject. Tables, graphs, diagrams, photographs. 50 ref. (Q23, ST)

354-Q. (German.) **Hardness Determinations With Small Loads. I. Fundamentals, and Effects on Measurements.** H. Wiegand, M. Kock and H. J. Meyer. *Metalloberfläche,* v. 10, no. 2, Feb. 1956, p. 35-39.

Fundamentals of Vickers hardness test. Relationship between micro and macrohardness measurement. Graphs, diagrams, micrograph. (Q29)

355-Q. (Japanese.) **Studies on Mechanical Properties at Elevated Temperature of Timken 16-25-6. II.** Taro Hasegawa, Osamu Ochiai and Junichi Ino. *Iron & Steel Institute of Japan, Journal,* v. 42, no. 2, Feb. 1956, p. 116-120.

Effects of solution treatment before hot cold working, working temperature, and amount of work on creep rupture properties at 650° C. and 31.5 kg. per sq. mm. Tables, graphs, micrographs. 3 ref. (Q3, SG-h)

356-Q. (Russian.) **Laboratory Methods for Determining the Tendency of Steel to Brittle Fracture.** Ia. M. Potak. *Zavodskaia Laboratoriia,* v. 22, no. 2, Feb. 1956, p. 208-217.

Types of brittle fracture. Study of this tendency with and without the action of surface-active or corrosive media. Effect of prior heat treatment, especially tempering temperature, and of shape and localization of stresses. Graphs, diagrams. 11 ref. (Q23, ST)

357-Q. (Book.) **Advances in Applied Mechanics.** H. L. Dryden and Th. von Karman, editors. v. IV. 413 p. 1956. Academic Press Inc., 125 East 23rd St., New York 10, N. Y. $10.00.

Theory and characteristics of boundary layers, elastic and plastic phenomena and fatigue properties of materials. (Q7, Q21, Q24, M26)

358-Q. (Book.) **Society for Experimental Stress Analysis, Proceedings** (Annual Volume), v. 13, no. 1, 1955, 213 p. Society for Experimental Stress Analysis, Central Square Station, P.O. Box 168, Cambridge 39, Mass.

Fundamentals of strain gages, stresscoat and other devices and techniques. (Q25)

359-Q. (Book—German.) **Text and Handbook of Engineering. XVII. Problems of the Plasticity Theory.** William Prager. 1955. 100 p. Birkhäuser Verlag, Basel, Switzerland. $3.15.

Mechanical behavior of plastic solids and of structures in the plastic range; methods of determining the load-carrying capacity of various types of rigid, perfectly plastic structures; finite plastic deformations. (Q23)

360-Q. (Book—German.) **Manual for Practical Material Testing in the Metal Industry.** O. Niezoldi. 4th Rev. Ed. 123 p. 1955. Springer-Verlag, Berlin, Germany.

Testing methods, determination of strength, hardness, flexibility and notch impact strength, weld joint testing. (Q general)

361-Q. Calibrated Porcelain Enamel Coatings. H. N. Staats and S. J. Baranowski. *American Ceramic Society Bulletin,* v. 35, Apr. 1956, p. 143-145.

New ceramic coatings which facilitate stress analysis of parts of operating equipment where heat and oil are present. Diagram, photographs. (Q25)

362-Q. Shock Simulator Shows Promise. E. J. Tangerman. *American Machinist,* v. 100, Apr. 23, 1956, p. 124-125.

New arrangement of piston and cylinder has real possibilities as a shock tester and as a press for high-velocity, high impact forming of aluminum, titanium and some steel alloys. Graphs, diagrams, photographs. (Q6, G general, Al, Ti, AY)

363-Q. Low-Nickel Austenitic Stainless Standardized. *American Machinist,* v. 100, Apr. 23, 1956, p. 126-128.

Types 201 and 202 can handle most jobs formerly done with 301 and 302. A summary of characteristics. Graphs, photographs. (Q general, SS)

364-Q. Biaxial Plastic Stress-Strain Relations of a Mild Steel for Variable Stress Ratios. Joseph Marin and L. W. Hu. *ASME Transactions,* v. 78, Apr. 1956, p. 499-508, disc. p. 508-509.

Plastic stress-strain relations for both constant and variable stress ratios and special tests for verifying certain requirements of plasticity theories. Graphs. 6 ref. (Q23, CN)

365-Q. The Stress-Rupture Strength of Type 347 Stainless Steel Under Cyclic Temperature. E. E. Baldwin. *ASME, Transactions,* v. 78, Apr. 1956, p. 517-525.

Stress-rupture tests were conducted in liquid sodium under constant and cyclic temperature conditions. Constant-temperature tests were conducted at temperatures between 1000 and 1200° F. Cyclic-test temperatures ranged from 416 to 1294° F., and cycle times ranged from 6 to 12 hr. Diagrams, graphs, micrographs, photographs, tables. 11 ref. (Q4, SS)

366-Q. Creep of 2S-O Aluminum Sheet at 400 to 450° C. W. F. Simmons and H. C. Cross. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* AECD-3926, June 1950, 11 p.

Data show that, at 400° C., 0.5% total deformation would be produced in 10,000 hr. by a stress of 250 psi. At 450° C., 200 psi. would be required. Graphs, table. (Q3, Al)

367-Q. The Mechanism of Plastic Deformation. W. T. Read, Jr. *Bell Laboratories Record,* v. 34, Apr. 1956, p. 133-137.

A discussion based on crystal models to determine why plastic deformation not only begins, but continues at unexpectedly low stresses, and why such deformation does not take place more or less homogeneously throughout the material, but is confined to slip planes. Diagrams, micrographs, photograph. 2 ref. (Q24)

368-Q. Elevated Temperature Properties of Beryllium. K. G. Wikle and W. W. Beaver. *Brush Beryllium Company (U. S. Atomic Energy Commission),* NYO-1114, July 1952, 22 p.

Tensile properties of hot-pressed beryllium in 250 to 950° C. range and of warm-pressed, hot-extruded beryllium in 250 to 600° C. range. Graphs, photographs, diagrams, tables. 3 ref. (Q23, Q27, Be)

369-Q. Notch Slow-Bend Testing of Zircaloy-2. R. G. Wheeler. *Hanford Atomic Products Operation (U. S. Atomic Energy Commission),* HW-40866, Jan. 1956, 20 p.

A recording tester that plots bending moment versus angle of bend rapidly detects small changes in mechanical properties using inexpensive equipment, minimum of material, and essentially no specimen machining. Photographs, micrograph, graphs. 20 ref. (Q5, Zr)

370-Q. Performance Tests on Indenters for Rockwell Hardness Testing. R. S. Marriner. *Industrial Diamond Review,* v. 16, Mar. 1956, p. 48-50.

Details of a method to eliminate local hardness variations of test blocks and variability of testing machines from results of different indenters. Diagrams, graph, tables. 2 ref. (To be continued.) (Q29, C)

371-Q. Relationship Between Small-Angle Dislocation Boundaries and

Creep. Betsy Ancker, Thomas H. Hazlett and Earl R. Parker. *Journal of Applied Physics,* v. 27, Apr. 1956, p. 333-340.

Small-angle dislocation boundaries of controlled nature and density were introduced into high-purity polycrystalline nickel prior to creep at 700° C.; the shape of the creep curve was varied drastically. Graphs, micrographs, table. 16 ref. (Q3, Ni)

372-Q. Sensitivity of Ultrasonic Attenuation and Velocity Changes to Plastic Deformation and Recovery in Aluminum. Akira Hikata, Rohn Truell, Andrew Granato, Bruce Chick and Kurt Lücke. *Journal of Applied Physics,* v. 27, Apr. 1956, p. 396-404.

Measurements of changes in ultrasonic attenuation together with changes in ultrasonic velocity were made concurrently with load strain measurements in tensile tests on the same specimen. Graphs, tables. 14 ref. (Q24, N4, Al)

373-Q. Stress in Electrodeposited Coatings. Its Significance and Measurement. Joseph B. Kushner. *Metal Finishing,* v. 54, Apr. 1956, p. 48-51, 57.

Causes of cracking and other defects caused by stresses. Diagrams. (To be continued.) (Q25, L17)

374-Q. Current Studies of Large Forgings. A. O. Schaefer. *Metal Progress,* v. 69, Apr. 1956, p. 62-67.

Outline of studies to find the cause and cure of brittle fracture and establish inspection methods whereby potentially dangerous forgings can be identified. Graphs. (Q23, Q26, F22, S13, S22, AY)

375-Q. Mechanical Properties of Medium-Carbon Boron Steels. J. R. Kattus and C. L. Dotson. *Metal Progress,* v. 69, Apr. 1956, p. 68-72.

Tensile, fatigue, impact and notched tensile properties of tempered medium-carbon boron steels are equivalent to those of other low-alloy steels tempered to the same hardness levels. Graphs, table. (Q general, AY)

376-Q. High-Temperature Tests on Aluminum Sand Castings. *Metal Progress,* v. 69, Apr. 1956. p. 80-B.

Curves plot tensile and yield strength against test temperature for 11 commonly used aluminum casting alloys at various temperatures. Graphs, table. (Q23, Q27, Al)

377-Q. More Heat Treatable Titanium. H. E. Fuhrmeister, W. M. Parris and H. D. Kessler. *Steel,* v. 138, Apr. 23, 1956, p. 118-121.

Data on duplex solution and aging treatment and resulting properties of two alloys. Micrographs, graphs, tables. (Q23, J27, Ti)

378-Q. Investigation of the Ni_3Al Phase of Nickel-Aluminum Alloys. Edward M. Grala. *U. S. National Advisory Committee for Aeronautics, Technical Note* 3660, Apr. 1956, 24 p.

The effects of homogenization treatments and of composition on the tensile properties of as-cast alloys in this phase region. Tables, graphs, photographs, micrographs. 4 ref. (Q27, Ni, Al)

379-Q. X-Ray Study of Behavior of Steels Under Repeated Cyclic Stress. A. Schaal. *Henry Brutcher Translation No.* 3102, 29 p. (Abridged from *Zeitschrift für Metallkunde,* v. 40, no. 11, 1949, p. 417-427.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 94-Q, 1950. (Q25)

380-Q. Strength and Ductility of Metals at Low and Extremely Low Temperatures. G. V. Uzhik. *Henry Brutcher Translation No.* 3537, 13 p. (Abridged from *Izvestiya Akademii Nauk SSSR, OTN,* no. 1, 1955, p. 57-66) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 608-Q, 1955. (Q23, Q24, AY, CN, SS, CI, Cu, Al, Cd)

381-Q. On the Connection Between Static and Kinetic Friction. N. F. Kunin and G. D. Lomakin. *Henry Brutcher Translation No.* 3650, 7 p. (From *Zhurnal Tekh. Fiziki,* v. 24, no. 8, 1954, p. 1367-1370.) Henry Brutcher, Altadena, Calif.

Study of changes in frictional force with metals, as an example of ordered microrupture, strain-hardening, and relaxation effects. Graphs. 3 ref. (Q9)

382-Q. Role of Inhomogeneity in Plastic Deformation. C. Zener. Paper from "High Temperature Properties of Materials". Department of Engineering Mechanics, Pennsylvania State University. p. 1-8.

Diagrams illustrate homogeneous and inhomogeneous deformation under various conditions. 7 ref. (Q24, Q27)

383-Q. Mechanical Properties of Metals at High Temperatures, Non-Periodic Loading. M. J. Manjoine. Paper from "High Temperature Properties of Materials". Department of Engineering Mechanics, Pennsylvania State University, p. 9-20.

Factors affecting elasticity, plasticity and failure of metals during their service life. Graphs. 22 ref. (Q general)

384-Q. Mechanical Dynamic Properties at High Temperatures. B. J.

Lazan. Paper from "High Temperature Properties of Materials". Department of Engineering Mechanics, Pennsylvania State University. p. 21-60.

Reviews properties under the action of simple external forces which normally result in a simple stress system, and factors governing the flow and failure of metals during their service life. Graphs, diagrams, table. 29 ref. (Q general, S21, ST)

385-Q. Metallurgical Effects in High-Temperature Properties of Metals. G. V. Smith. Paper from "High Temperature Properties of Materials". Department of Engineering Mechanics, Pennsylvania State University. p. 61-77.

Many properties of interest in applying metals at elevated temperatures are affected by metallurgical variables such as chemical composition, melting and deoxidation practices, and heat treatment. Graphs, micrographs. 35 ref. (Q3, ST)

386-Q. Design for High Temperatures. D. R. Miller. Paper from "High Temperature Properties of Materials". Department of Engineering Mechanics, Pennsylvania State University. p. 79-92.

Review of problems facing the designer of apparatus for high-temperature service. Graphs. 16 ref. (Q general, ST)

387-Q. (German.) **Recent Results From Investigation of the "True Elastic Limit".** E. Mohr. *Aluminium,* v. 32, no. 4, Apr. 1956, p. 202-204.

Extensive comparative studies show that the bending tensile strength obtained from tests involving combination of static with cyclic stressing must be close to the fatigue strength. Diagram, photograph, graphs, tables. (Q21, Al)

388-Q. (German.) **The Directionality of Hardness of Aluminium.** P. Grodzinski. *Aluminium,* v. 32, no. 4, Apr. 1956, p. 208-209.

Experiments with a specially shaped double cone-diamond, with which the directionality of the hardness as a function of the crystal orientation can be clearly demonstrated. Graphs, table, micrograph, diagrams. 6 ref. (Q29, Al)

389-Q. (German.) **Investigation of Rolled and Recrystallized Textures of Carbonyl Steel.** Frank Haessner and Helmut Weik. *Archiv für das Eisenhüttenwesen,* v. 27, no. 3, Mar. 1956, p. 153-160.

Determination on straight and cross rolled sheets by means of X-rays. Influence of annealing and working on the formation of recrystallization textures. Tables, diagrams, diffractograms. 24 ref. (Q24, N5, CN)

390-Q. (Russian.) **Plastic Deformation and Fracture of Metallic Single and Polycrystals, With Static and Repeated Torsion.** F. P. Rybalko. *Fizika metallov i metallovedenie,* v. 1, no. 2, 1955, p. 231-238 + 2 plates.

Tests reveal that fracture is preceded by localization of the deformation in zones of certain orientations. Relation between rate of deformation and dislocation at different stages. Graph, photographs, micrographs. 6 ref. (Q24, Q26, Cu, Zn, Cd, Al)

391-Q. (Russian.) **Problem of the Effect of Friction on the Changes in the Stressed State of Surface Layers of Metals During Plastic Compression.** K. V. Savitskii. *Fizika Metallov i Metallovedenie,* v. 1, no. 2, 1955, p. 239-245.

Data on effects of lubrication on numerical values of stresses during the plastic compression of copper. Relation between contact stresses and differences in the geometrical shape of the test pieces. Possibility of determining effectiveness of lubricants, under plastic compression conditions, by the magnitude of difference in contact and mean true stresses. Graphs, table, photograph. 4 ref. (Q24, Q9, Cu)

392-Q. (Russian.) **Problem of Deformability of Alloys in a Metastable State.** M. B. Makogon. *Fizika metallov i metallovedenie,* v. 1, no. 2, 1955, p. 246-250.

Effect of rate of plastic deformation on resistance to deformation by duralumin in quench-hardened, annealed, and aged states, at temperatures of +20 and −50° C. Relaxation and aging with respect to the effect of plastic deformation. Conditions of plastic deformation, of alloys in the metastable state, affect properties of the metal after aging. Graphs. 15 ref. (Q24, Al)

393-Q. (Russian.) **Study of Microscopic Nonunifomity of the Plastic Deformation of Steel.** B. B. Chechulin. *Fizika metallov i metallovedenie,* v. 1, no. 2, 1955, p. 251-260.

Character of plastic deformation of metals as contrasted with deformation of usual isotropic bodies. Distribution of deformations of real polycrystalline metals; position of grain axes during plastic flow or creep. Diagram, graphs, table. 3 ref. (Q24, Q3, AY, CN, Al)

394-Q. (Russian.) **Some Regularities of Plastic Deformation and Fracture of**

Metals Under Tension. V. A. Pavlov and K. A. Vshivtseva. *Fizika metallov i metallovedenie,* v. 1, no. 2, 1955, p. 261-268.

Experimental data on temperature relation of complete and uniform elongations, and on variation in the character of fracture during tensile stressing of metals. Graphs, table, photograph. 10 ref. (Q24, Q26, Q27, Cd, Pb, Mg, Fe)

395-Q. (Russian.) **Study of Diffusion Creep of Metals and Alloys. I. Diffusion Creep of Fine Metal Threads.** Ia. E. Geguzin and V. Z. Bengus. *Fizika Metallov i Metallovedenie,* v. 1, no, 2, 1955, p. 269-272.

Relation of relative elongation to time. Diffusion dislocation and transfer of atoms. Distinction between diffusion creep and plastic deformation, occurring during slip and twinning processes. Photograph, diagram, graphs. 8 ref. (Q3, Q24, Pb)

396-Q. (Russian.) **Distribution of Internal Stresses in Plates Butt-Welded in One Operation.** V. S. Ignat'eva. *Svarochnoe Proizvodstvo,* 1956, no. 3, Mar. 1956, p. 12-17.

Attempts to determine the third component of tri-axial residual stress in plates. Inverse relation of the third component to the thermal load; slow increase in this component with the thickness of the plate. Longitudinal and transverse stresses as functions of the width and the thickness of the plate. Calculation of plastic deformations in welded joints. Diagrams, graphs. 12 ref. (Q24, Q25)

397-Q. Hot-Hardness Survey of the Zirconium-Uranium System. W. Chubb, G. T. Muehlenkamp and A. D. Schwope. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* BMI-833, May 1953, 16 p.

Survey made at temperatures from room temperature to 900° C. Composition of maximum hardness increases from 40 at. % zirconium at room temperature to 60 at. % zirconium at 600° C. At 700° C., the hardness data indicated the presence of the beta uranium phase in alloys containing 95 and 100 at. % uranium. Diagram, graphs, tables. (Q29, M24, Zr, U)

398-Q. Mechanical Properties of Striated Uranium Slugs. M. L. Holzworth. *E. I. du Pont de Nemours & Co., Savannah River Laboratory, Technical Division (U. S. Atomic Energy Commission),* DP-139, Nov. 1955, 27 p.

Nonmetallic inclusions, which are described as "striations" have no adverse effect on the tensile, impact, torsion or fatigue strength of uranium slugs. Mechanical properties are primarily dependent on crystallographic orientation which may be varied by heat treatment. Diagrams, graphs, photographs, tables. 8 ref. (Q general, U)

399-Q. The Straining of Metals by Indentation Including Work-Softening Effects. G. H. Williams and Hugh O'Neill. *Iron and Steel Institute, Journal,* v. 182, Mar. 1956, p. 266-273.

The process of elastic and plastic indentation is reviewed, and strain-hardening examined by explorations upon and below indentations in steel, aluminum and copper. Main study was on annealed copper using conical tools of three different angles, and indentations of increasing depths made with a ball. Graphs, tables. 24 ref. (Q29, N7, Al, Cu, ST)

400-Q. A Study of the Impact Properties of Boron-Treated Steel. Samuel J. Rosenberg and John D. Grimsley. *Iron and Steel Institute, Journal,* v. 182, Mar. 1956, p. 278-292.

Twenty-one steels from the same openhearth heat and made to a base composition of 0.43% carbon and 1.60% manganese, were studied to evaluate the effect of boron on the Charpy V-notch impact properties over the temperature range of −140 to +140° F. Diagram, graphs, tables. 9 ref. (Q6, ST)

401-Q. Application of Electrical Analogy for the Solution of Problems in Elasticity. V. Cadambe and S. G. Tewari. *Journal of Scientific & Industrial Research,* v. 15, sec. B, Mar. 1956, p. 107-111.

Design of an electrolytic tank and accessories; technique of measuring the potential distribution for solving Laplace equation; problem of bending a prismatic triangular bar. Shear stresses calculated along the section of symmetry. Diagram, graphs. 4 ref. (Q21)

402-Q. Creep of High-Purity Nickel. *Metal Industry,* v. 88, Apr. 6, 1956, p. 265-266.

Creep behavior in tension of annealed specimens under constant load at 300, 700, 900 and 1200° F. Graphs, photographs. (Q3, Ni)

403-Q. Avoiding Weld Failures in Austenitic Stainless Steel Pipe. *Metal-Working,* v. 12, May 1956, p. 14-17.

Common causes of failure and how to avoid them. Tables. (Q26, K1, SS)

404-Q. Analysing Stress by Rubber Models. L. Chitty. *Rubber Developments,* v. 9, Spring, 1956, p. 5-7.

Recent advances in technique of molding rubber have opened up a new field in obtaining solutions to design of structures. Photographs. (Q23, ST)

405-Q. "Miles Per Quart +". IV. Wear; Engine Sludge; Oil Consumption. J. M. Nuttall. *Scientific Lubrication,* v. 8, Apr. 1956, p. 19-23.

Study of wear in engines, using lubricants with and without corrosion-inhibiting additives. Photographs. (To be continued.) (Q9, R10)

406-Q. Fracture Behavior in the Notch Slow-Bend Test. W. J. Murphy and R. D. Stout. *Welding Journal,* v. 35, Apr. 1956, p. 169S-180S.

Effect of weld metal, heat affected zone and unaffected base plate in the initiation and propagation of the crack leading to brittle failure. Diagrams, tables, graphs, micrographs. 8 ref. (Q26, Q5, ST)

407-Q. Effect of Cold Work on the Mechanical Properties of Pressure Vessel Steels. W. T. Lankford. *Welding Journal,* v. 35, Apr. 1956, p. 195S-206S.

Appraises present knowledge regarding effects of cold work on mechanical properties of steels; indicates areas where further research is needed. Graphs, tables. 37 ref. (Q general, G general, ST)

408-Q. (French.) **Fatigue of Duralumin Sheet With Surface Pits.** Enrique J. G. Sardinero. *Technique et Science Aéronautiques,* 1955, no. 6, p. 367-372.

Tests conducted to determine effects of localized corrosion on the fatigue strength of duralumin sheets. Micrographs, photographs, graph. 10 ref. (Q7, R2, Al)

409-Q. (German.) **Revision of Mechanical and Technological Properties of Type "G" $AlSi_6Cu_3$ Alloy With Greater Changes in Concentration of the Alloying Elements.** E. Bertram, R. Kümmerle and O. Asbeck. *Giesserei,* v. 43, no. 7, Mar. 29, 1956, p. 153-159.

Investigation of heat cracking, mechanical properties of ingot-mold specimens, effect of grain refinement. Tables, diagrams, photographs, graphs, micrographs. 5 ref. (Q general, E25, Al)

410-Q. (German.) **Comparative Ductility Investigation of Case Hardened Steels.** M. Kroneis. *Schweizer Archiv für Angewandte Wissenschaft und Technik,* v. 22, no. 3, Mar. 1956, p. 85-92.

Impact ductility of alloyed and unalloyed case hardened steels; Cr-Ni, Cr-Mo, Ni-Mo, and Ni-steels as well as Cr-Mn and Cr-steels were investigated. Graphs, diagrams, tables. (Q6, Q23, ST)

411-Q. (Japanese.) **On the Brittle Fracture of Welded Structures.** Midori Otani. *Journal of Railway Engineering Research, (Japan),* v. 13, nos. 2-3, Feb. 10, 1956, p. 36-80.

Brittle fractures were assorted into four classes and the phenomena investigated, using specimens suitable for surveying each type. Diagrams, graphs, tables, photographs. 56 ref. (Q26)

412-Q. (Japanese.) **Notch Sensitivity of Steels.** Midori Otani. *Journal of Railway Engineering Research, (Japan),* v. 13, nos. 2-3, Feb. 10, 1956, p. 81-89.

Reports on the notch sensitivity of steels and the brittle fracture of welded structures reviewed, further research problems surveyed. Diagrams, photographs, graph. 46 ref. (Q23, ST)

413-Q. (Polish.) **Silicon Steel of Increased Strength Properties.** I. S. Przegalinski. *Prace Instytutow Ministerstwa Hutnictwa,* v. 8, no. 1, 1956, p. 17-26.

Investigates possibility of substituting silicon for manganese in steel of the type ST52. Graphs, tables. 63 ref. (Q23, AY)

414-Q. (Russian.) **Resistance of Metals and Minerals, Including Very Hard Ones, to Abrasive Wear.** M. M. Khrushchov and M. A. Babichev. *Doklady Akademii Nauk SSSR,* v. 107, no. 1, Mar.-Apr. 1956, p. 75-78.

Tests provide data to plot relation between hardness and wear resistance. Nature of this relationship. Graphs, tables. 5 ref. (Q29, Q9, Co, Cr, Ti, Mo, Be)

415-Q. (Russian.) **Electrocapillary Effect in Reducing Hardness and External Friction of Metals.** E. K. Vengstrem, V. I. Likhtman and P. A. Rebinder. *Doklady Akademii Nauk SSSR,* v. 107, no. 1, Mar.-Apr. 1956, p. 105-107.

Potentials of null charge of hard metals. Role of adsorptive layers and adsorption of surface-active substances on frictional properties. Table, graph. 18 ref. (Q29, Q9, Zn, Pb, Au, Te, Pt)

416-Q. (Russian.) **Work-Hardening Curves of Technical Iron.** S. I. Gubkin and G. N. Mekhed. *Izvestiia Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk,* 1956, no. 2, Feb. 1956, p. 132-135.

Curves under two types of load (mono-axial tension and torsion), and various formulas (Osipov's, Nadai's) for them. Octahedral tangential stress and octahedral sheer formulas. Graphs, photographs. 4 ref. (Q23, Fe)

417-Q. (Russian.) **Distribution of Contact Stresses Between Shrink-Fitted Sleeve and Shaft.** M. M. Kobrin. *Izvestiia Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk,* 1956, no. 2, Feb. 1956, p. 136-139.

Strength of unions where sleeve has been fitted on when hot or forced on. Experimental data compared with data according to Lamé's formula for determining contact stresses. Conditions under which even stress distribution is achieved. Graphs, diagrams. 4 ref. (Q25, K13)

418-Q. (Russian.) **A New Material "Gliftamal" for Plane Models Used in the Polarization-Optical Method of the Study of Stresses.** M. F. Bokshtein, N. I. Prigorovskii, S. I. Sokolov and N. A. Shchegolevskaia. *Izvestiia Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk,* 1956, no. 2, Feb. 1956, p. 139-141.

Various types of "Gliftamal" have been developed. Use in creep and other tests of machine parts and constructions. Photograph, table, diagram. 7 ref. (Q3, Q25)

419-Q. (Russian.) **Effect of Zirconium on Some Properties of Magnesium Alloys.** F. A. Borin and E. S. Sollertinskaia. *Metallovedenie i Obrabotka Metallov,* 1956, no. 2, Feb. 1956, p. 8-13.

Effect of zirconium, zinc and zirconium together, grain size, and heat and corrosion resistance on mechanical properties, especially long-term hardness, of cast, stamped and aged specimens of magnesium alloys. Graphs, micrographs, tables. 5 ref. (Q general, R general, M27, Mg, Zn, Zr)

420-Q. (Russian.) **Effect of Arsenic on the Fatigue Strength of Rails.** L. M. Shkol'nik. *Metallovedenie i Obrabotka Metallov,* 1956, no. 2, Feb. 1956, p. 14-21.

Chemical composition, mechanical properties and service life (number of cycles before fracture) of rails in fatigue tests. Coefficients of correlation characterizing the effect of arsenic, carbon, manganese and phosphorus on service life (before fracture) of rails. Graphs, tables, photographs, diagram. 4 ref. (Q7, S21, CN)

421-Q. (Russian.) **Thermal and Temper Brittleness of Ferritic (Pearlitic) Steel.** P. B. Mikhailov-Mikheev. *Metallovedenie i Obrabotka Metallov,* 1956, no. 2, Feb. 1956, p. 23-33.

Sensitivity of various pearlitic steels to thermal brittleness during lengthy soakings, with and without load. Effect of repeated tempering on impact strength of previously quenched and tempered steels. Effect of tempering temperature, cooling rate, alloy composition and heat treatment combinations. Physical nature of brittleness, including segregation at grain boundaries and lattice dislocations. Graphs, table. 18 ref. (Q23, J29, ST, SS)

422-Q. (Russian.) **Nature of Temper Brittleness of Pearlitic Steels.** V. I. Prosvirin and E. I. Kvashnina. *Metallovedenie i Obrabotka Metallov,* 1956, no. 2, Feb. 1956, p. 34-49.

Chemical compositions of steels used; change in quantity of carbides in steels passing into brittle state; microstructure of brittle and nonbrittle specimens; effect of heat treatment conditions, including tempering time and high-temperature tempering on secondary phases and internal friction; role of molybdenum in checking tempering brittleness; effect of quenching temperature on grain size and impact strength. Graphs, tables, micrographs. 36 ref. (Q23, Q22, J29, AY)

423-Q. (Russian.) **Effect of Titanium on Properties of X15H60 and X20H80 Alloys.** *Stal',* v. 16, no. 3, Mar. 1956, p. 217-220.

The presence of titanium in nickel-chromium steels improves fabrication characteristics and mechanical properties, increases their electrical resistance. Tables, graphs. 3 ref. (Q general, P15, AY)

424-Q. (Russian.) **Internal Stress in Electrodeposits. I. Stresses in Deposits of Zinc.** K. M. Gorbunova and O. S. Popova. *Zhurnal Fizicheskoi Khimii,* v. 30, no. 2, Feb. 1956, p. 269-276.

Internal stresses of the deposits and their nature in connection with the surface and crystalline structure. Effect of electrolyte composition, current density and deposit thickness on the stress. Diagram, graphs, electromicrographs. 10 ref. (Q25, L17)

425-Q. (Spanish.) **Variation in the Properties of Spring Steels as a Function of Their Heat Treatment and Surface Finish.** Mario Pujol Roig. *Instituto del Hierro y del Acero,* v. 9, no. 43, Feb. 1956, p. 183-197; disc., p. 197-198.

Types of steel for springs, with the appropriate heat treatments. Experimental study of a carbon spring steel — physical properties, tests, heat treatment (classical and isothermal), surface treatments. Relation of type of heat and surface treatments to fatigue behavior. Treatment resulting in bainitic structure. Advantages of polishing and phosphatizing. Tables, diagrams, photographs, micrographs, graphs. 11 ref.
(Q7, J general, L14, CN, SG-b)

426-Q. (Spanish.) Contribution to the Study of Microhardness. Francisco Munoz del Corral. *Instituto del Hierro y del Acero,* v. 9, no. 43, Feb. 1956, p. 199-212.

Revision of the concepts of Brinell and Vickers hardness. Critique of theory of microhardness variation as explained by load. Importance of difference between hardness of surface layers and inner metal. Effect of electropolishing in hardness testing. Tables, graphs. 10 ref.
(Q29, L13, AY, Cu)

427-Q. (Swedish.) The Charpy V-Notch Test Piece for Testing Mild Steel for Welding Purposes. G. Malmberg. *Jernkontorets Annaler,* v. 140, no. 2, 1956, p. 87-100.

Impact strength vs. temperature curves determined for a series of mild steels. Tables, graphs.
(Q6, K9, CN)

428-Q. A Small and Inexpensive Device for Sustained Loading Testing. R. H. Raring and J. A. Rinebolt. *ASTM Bulletin,* 1956, no. 213, Apr. 1956, p. 74-76.

An easily made tensile loading device provides a cheap, fast and satisfactory testing method. Photographs. 5 ref. (Q27)

429-Q. Hot Tearing of Castings: A Review of the Literature. R. A. Dodd. *Canada, Department of Mines and Technical Surveys, Mines Branch Research Report No.* PM184, July 1955, 47 p.

Occurrence, classification and identification of hot tears; theories of hot tearing; effect of composition; methods of assessing susceptibility to hot tearing. Diagrams, graphs, micrograph, photographs. 67 ref. (Q23)

430-Q. Hot Tearing of Binary Magnesium-Aluminium and Magnesium-Zinc Alloys. R. A. Dodd. *Canada, Department of Mines and Technical Surveys, Mines Branch Research Report No.* PM191, Aug. 1955, 21 p.

The susceptibility to hot tearing of alloys containing up to 10% alloying additions determined by method involving measuring the cracking tendency of flat rings cast in a steel mold. Diagrams, graphs, photographs. 10 ref.
(Q23, Al, Zn, Mg)

431-Q. Textures in Rolled Uranium Rod. W. P. Chernock and L. W. Kates. *Sylvania Electric Products, Inc. (U. S. Atomic Energy Commission),* AECD-3999, Apr. 1952, 21 p.

The textures in a hot-pressed uranium rod invetigated after reductions of area were made up to 70%. The texture at 70% reduction of area could best be described as very close to an (O41) fiber texture. Tables, graphs, diagrams. 4 ref. (Q24, U)

432-Q. Effect of Varying Reduction on the Preferred Orientation in Rolled Uranium Rods. M. H. Mueller, H. W. Knott and P. A. Beck. University of Chicago, Argonne National Laboratory (U. S. Atomic Energy Commission), AECD-4208, May 1954, 32 p.

Study of preferred orientation in uranium rod investigated after reductions at 300 and 600° C. The type of orientation developed by 600° C. rolling is somewhat different from that obtained by 300° C. rolling. Thermal cycling and thermal expansion data for these rods. Diagrams, graphs, tables. 9 ref.
(Q24, U)

433-Q. Introductory Paper. N. P. Allen. Paper from "Creep and Fracture of Metals at High Temperatures". Her Majesty's Stationery Office. p. 1-17 disc. 18.

Progress made in the study of plastic deformation and fracture since 1946. Graphs, micrographs, tables. 9 ref. (Q3, Q26)

434-Q. A Discussion of Some Models of the Rate-Determining Process in Creep. N. F. Mott. Paper from "Creep and Fracture of Metals at High Temperatures". Her Majesty's Stationery Office. p. 21-24.

Conclusion is that there are great difficulties in accepting the hypothesis of "climb" of dislocations, and that cell formation (polygonization) may occur through slip alone. In this case the rate-determining process must be slip, and it is suggested that the barriers of greatest importance are jogs in screw dislocations. Diagram. 14 ref.
(Q3, Q24, M26, N5)

435-Q. Plastic Deformation of Aluminium Single Crystals at Elevated Temperatures. R. D. Johnson, A. P. Young and A. D. Schwope. Paper

from "Creep and Fracture of Metals at High Temperatures". Her Majesty's Stationery Office. p. 25-45; dis. 46.

Creep tests were performed at elevated temperatures while maintaining a constant resolved shear stress to study the nature of the creep curve in crystals oriented for single slip on a (111) plane. Diagrams, graphs, micrographs, table. 43 ref. (Q3, Q24, Al)

436-Q. Mechanism of Grain Boundary Displacement and Its Relation to the Creep Process as a Whole. F. N. Rhines. Paper from "Creep and Fracture of Metals at High Temperatures". Her Majesty's Stationery Office. p. 47-56; disc. 57.

Tensile creep behavior of pure aluminum bicrystals, having flat grain boundaries at 45° to their axes of loading. Graphs, micrographs, photograph. 8 ref. (Q3, N3, Al)

437-Q. Interaction Between Crystal Slip and Grain Boundary Sliding During Creep. D. McLean. Paper from "Creep and Fracture of Metals at High Temperatures". Her Majesty's Stationery Office. p. 73-87; disc. 88.

Rotation of sub-crystals in aluminum during creep is shown to be proportional to elongation, from which it is deduced that practically all the crystal deformation occurs by a normal glide process; the amount of grain boundary sliding occurring in aluminum and copper during creep is shown to be proportional to elongation, suggesting that a linear interaction exists between crystal slip and grain boundary sliding. Diagrams, graph, micrographs, table. 22 ref. (Q3, Q24, Al, Cu)

438-Q. Some Fundamental Experiments on High Temperature Creep. John E. Dorn. Paper from "Creep and Fracture of Metals at High Temperatures". Her Majesty's Stationery Office. p. 89-132; disc. 133-134.

Analysis of previously published and unpublished experimental observations. Graphs, tables, photograms, micrographs. 55 ref. (Q3)

439-Q. Creep and Aging Effects in Solid Solutions. A. H. Cottrell. Paper from "Creep and Fracture of Metals at High Temperatures". Her Majesty's Stationery Office. p. 141-152; disc. 153-155.

If recovery occurs during creep the creep resistance is reduced; if strain aging occurs, it is increased. Aging in substitutional alloys is accelerated during plastic flow. Other aspects considered. Graphs, micrographs, table. 35 ref. (Q3, N7)

440-Q. Microstructure and Creep. J. W. Freeman and C. L. Corey. Paper from "Creep and Fracture of Metals at High Temperatures". Her Majesty's Stationery Office. p. 157-172; disc. 173.

Relationships between microstructure and creep reviewed from standpoint of extensive research on engineering alloys. Principles involved in solid solution, precipitation phenomena, cold work, multiphases, transformation structures, melting practice and grain size. Graphs, tables. 31 ref. (Q3, N7, N12)

441-Q. The Effect of Alloying on the Creep of Metals. L. Rotherham and C. R. Tottle. Paper from "Creep and Fracture of Metals at High Temperatures". Her Majesty's Stationery Office. p. 175-188; disc. 189.

Theories of creep, effects of solid solution alloys and complex alloys. Graphs. 66 ref. (Q3)

442-Q. Basic Principles of a Creep-Resisting Alloy. A. Constant and G. Delbart. Paper from "Creep and Fracture of Metals at High Temperatures". Her Majesty's Stationery Office. P. 191-210; disc. 211-214.

Fabrication and shaping, properties of importance during use, resistance to creep, influence of heat treatment. Graphs, micrographs, tables. 27 ref. (Q3, SG-h)

443-Q. Creep of Solid Solutions and Compounds in Metallic Systems. I. I. Kornilov. Paper from "Creep and Fracture of Metals at High Temperatures". Her Majesty's Stationery Office. p. 215-219.

Short survey of creep tests on solid solutions and compounds in metallic systems and general conclusions drawn as a result of this work. Graphs. 21 ref. (Q3)

444-Q. The Effect of Changing Loads During Creep. Y. N. Rabotnov. Paper from "Creep and Fracture of Metals at High Temperatures". Her Majesty's Stationery Office. p. 221-224, disc. 225.

Certain possibilities of the phenomenological description of one-dimensional creep in tension. Graphs. 5 ref. (Q3)

445-Q. Theory of Accelerated Creep and Rupture. C. Crussard and J. Friedel. Paper from "Creep and Fracture of Metals at High Temperatures". Her Majesty's Stationery Office. p. 243-262.

An attempt to classify and clarify the most important facts which have been established in this field by various authors. Diagrams, graphs. 50 ref. (Q3, Q4)

446-Q. A Theory of Brittle and Ductile Fracture With Application to Creep Fracture, Based on the Dynamic Behaviour of Dislocations and Condensation of Vacancies. A. Kochendörfer. Paper from "Creep and Fracture of Metals at High Temperatures". Her Majesty's Stationery Office. p. 263-280.

Two processes presented, one based on dynamic behavior of dislocations leading to brittle fracture, the other on the condensation of vacancies produced by dislocations leading to ductile fracture. Diagrams, graphs, tables. 66 ref. (Q26, Q3, M26)

447-Q. Observations on Third Stage Creep and Fracture. C. H. M. Jenkins. Paper from "Creep and Fracture of Metals at High Temperature". Her Majesty's Stationery Office. p. 287-298; disc., p. 308-316.

Occurrence and mutual relationship of intercrystalline cracking, polygonization, recrystallization and transcrystalline rupture in metals and alloys at elevated temperatures. Tests were made in creep units thermostatically controlled and maintained for long periods in high vacuum. Micrographs, table. 7 ref. (Q3, Q26, N5)

448-Q. Tertiary Creep of Nimonic 80A. W. Betteridge. Paper from "Creep and Fracture of Metals at High Temperatures". Her Majesty's Stationery Office. p. 299-307; disc., p. 308-316.

Experiments were planned to measure the changes occurring during the course of a normal tensile creep test, particular attention being given to the stage of tertiary creep. Results lead to a formula for the creep curve which agrees very accurately with the observed curves for this alloy. Graphs, micrographs, tables. 5 ref. (Q3, Ni)

449-Q. Grain Boundary Participation in Creep Deformation and Fracture. N. J. Grant. Paper from "Creep and Fracture of Metals at High Temperatures". Her Majesty's Stationery Office. p. 317-330; disc., p. 331.

Based on creep-rupture studies of a series of metals and alloys varying in composition from that of very high-purity aluminum to that of a complex age-hardenable gas turbine alloy, it is shown how alloying affects the behavior of grain boundary deformation and fracture. Graphs, micrographs. 6 ref. (Q3, Q26, M27, Al, SG-h)

450-Q. Investigations Into the Development of Intercrystalline Fractures in Various Steels Under Triaxial Stress. W. Siegfried. Paper from "Creep and Fracture of Metals at High Temperatures". Her Majesty's Stationery Office. p. 333-360; disc., p. 261.

Tests carried out to obtain data for the practical application of the metals while at the same time revealing the physical facts reflected in these processes. Diagrams, graphs, tables. 15 ref. (Q26, ST)

451-Q. Note on the Fracture Under Complex Stress Creep Conditions of an 0.5% Molybdenum Steel at 550° C., and a Commercially Pure Copper at 250° C. A. E. Johnson and N. E. Frost. Paper from "Creep and Fracture of Metals at High Temperatures". Her Majesty's Stationery Office. p. 363-378; disc., p. 379-382.

Includes graphs, tables. 3 ref. (Q3, Q4, Q26, Cu, AY)

452-Q. The Effect of a "V" Notch on the Tensile Creep Behaviour of a Molybdenum-Vanadium Steel. R. W. Ridley and H. J. Tapsell. Paper from "Creep and Fracture of Metals at High Temperatures". Her Majesty's Stationery Office. p. 383-400; disc., p. 401-402.

Tensile creep tests were made on a molybdenum-vanadium steel over the range 650-525° C. and at stresses of from 17 to 5 tons per sq. in. using test pieces in which the "V" notch was machined circumferentially. Diagrams, graphs, micrographs, tables. 9 ref. (Q3, AY)

453-Q. Torsion-Testing Equipment for High-Temperature Creep Studies. J. A. Stavrolakis. Paper from "High-Temperature Technology". John Wiley & Sons. p. 397-402.

Report of equipment which permits measurements of strain within a uniform temperature interval; schematic representation and operation of the system. Diagrams, photographs. (Q3, Q1)

454-Q. Influence of Boron on Cast Cobalt-Base S-816 Alloy. W. E. Blatz, E. E. Reynolds and W. W. Dyrkacz. Paper from "Symposium on Metallic Materials for Service at Temperatures Above 1600° F." American Society for Testing Materials, p. 16-23; disc., p. 24-28.

Cast cobalt-base alloys with stress-rupture properties at 1650° F. equivalent to those of S-816 alloy at 1500° F. were developed. Optimum rupture strengths plus good rupture ductility are obtained with approximately 1% boron. Mircrographs, tables, graphs. 2 ref. (Q4, Co)

455-Q. Effect of Heat Treatment and Structure Upon Creep Properties of Nimonic Alloys Between 750 and 950° C. W. Betteridge and R. A. Smith. Paper from "Symposium on Metallic Materials for Service at Temperatures Above 1600° F." American Society for Testing Materials, p. 29-39.

Four heat treatment methods and resulting creep properties. Influence of titanium and aluminum content, effect of precipitation. Tables, graphs, micrographs. 9 ref. (Q3, J general, N7, Ni)

456-Q. Effect of Rare Earth Additions on the High-Temperature Properties of a Cobalt-Base Alloy. J. E. Breen and J. R. Lane. Paper from "Symposium on Metallic Materials for Service at Temperatures Above 1600° F." American Society for Testing Materials. p. 57-65; disc., p. 66-68.

High-temperature strength, as well as ductility, were increased in both as-cast and aged material at all temperatures investigated, with the greatest benefit occurring at 1500° F. Photograph, tables, graphs. 10 ref. (Q general, Co)

457-Q. Stress-Rupture Properties of Inconel 700 and Correlation on the Basis of Several Time-Temperature Parameters. S. S. Manson and G. Succop. Paper from "Symposium on Metallic Materials for Service at Temperatures Above 1600° F." American Society for Testing Materials, p. 40-46.

Alloy shows promise for use at a temperature of 1600° F. and perhaps higher. Table, graphs. 10 ref. (Q4, Ni)

458-Q. Creep, Rupture, and Notch Sensitivity Properties of S-816 Alloy Up to 1650° F. Under Fatigue and Static Stress. F. Vitovec and B. J. Lazan. Paper from "Symposium on Metallic Materials for Service at Temperatures Above 1600° F." American Society for Testing Materials. p. 69-88; disc., p. 89.

Role of creep and fatigue as design factors. Relation of notch sensitivity to loading conditions with particular reference to temperature and ratio of alternating-to-mean stress. Micrographs, graphs. 11 ref. (Q2, Q7, Co)

459-Q. High-Temperature Properties of Molybdenum-Rich Alloy Compositions Made by Powder Metallurgy Methods. W. L. Bruckart and R. I. Jaffee. Paper from "Symposium on Metallic Materials for Service at Temperatures Above 1600° F." American Society for Testing Materials. p. 111-134.

Effects of metallic and oxide additions on creep-rupture properties and on resistance to recrystallization. Zirconium dioxide, titanium dioxide and silicon were outstanding alloying additions. Micrographs, graphs, tables. 15 ref. (Q3, H general, Mo)

460-Q. Tension and Torsion Tests on Nimonic Alloys at High Temperatures. E. D. Ward and W. G. Tallis. Paper from "Symposium on Metallic Materials for Service at Temperatures Above 1600° F." American Society for Testing Materials. p. 135-145.

Apparatus and test methods for both types of test, at temperatures up to 1000° C. Graphs, table. (Q27, Q1, Ni-g)

461-Q. Thermal Fatigue Testing of Sheet Metal. H. E. Lardge. Paper from "Symposium on Metallic Materials for Service at Temperatures Above 1600° F." American Society for Testing Materials. p. 146-159; disc., p. 160-163.

Test was devised based on heating a specimen with a central hole to 1650° F. and then cooling it rapidly in a blast of cold air. The thermal cycle was based on the temperature curve of a flame tube on an engine during accelerating and decelerating conditions. Micrographs, photograph, graphs, tables, diagram. (Q7)

462-Q. Thermal Shock Testing of High-Temperature Metallic Materials. Thomas A. Hunter. Paper from "Symposium on Metallic Materials for Service at Temperatures Above 1600° F." American Society for Testing Materials. p. 164-179; disc., p. 180-182.

By means of a test using an electrical resistance heating cycle followed by a cold-air-blast shock-cooling cycle, comparative evaluations were made for 15 materials at temperatures between 1600 and 2000°F. Graphs, tables, micrographs, photographs, diagrams. 9 ref. (Q23)

463-Q. (English.) **Deformation of Thin Copper Crystals.** Hideji Suzuki, Susumu Ikeda and Sakae Takeuchi. *Physical Society of Japan, Journal*, v. 11, no. 4, Apr. 1956, p. 382-393.

Stress-strain curves of a great number of copper crystals having various radii from 0.06 to 1 mm. were measured. The range of easy glide increases considerably when the radius of the crystal decreases. Table, graphs, diagrams, 31 ref. (Q24, Cu)

464-Q. (Russian.) **A New Bearing Alloy.** N. M. Rudnitskii and A. V.

Lakedemonskii. *Avtomobil'naia i Traktornaia Promyshlennost'*, 1956, no. 2, Feb. 1956, p. 9-12.

Antifriction properties and structure in relation to chemical composition and other factors. Comparisons with other bearing alloys, including babbits. Diagrams, photographs, graphs, micrograph, table. 3 ref. (Q9, T7, SG-c, Pb, Sb, Sn)

465-Q. (Russian.) **Use of Correlation Method to Study Interrelation Among Mechanical Properties of Various Alloy Steels.** P. V. Sklinev. *Zavodskaia Laboratoriia*, v. 22, no. 3, Mar. 1956, p. 325-329.

Use of graphic methods and equations to correlate values for mechanical properties of several steels. Tables, graph. (Q general, AY)

466-Q. (Serbian.) **Steel Products on Niobium and Tantalum Base for Aircraft Jet Engines.** Branko I. Bozic. *Glasnik Khemiskog Drushtva (Beograd)*, v. 20, no. 9, 1955, p.577-583.

Tests of stainless steel alloyed with tantalum and columbium for use in jet engine construction. Methods of production. Effect of alloying metals on mechanical properties at higher temperatures. Possibilities of replacing columbium by tantalum. Tables. 2 ref. (Q general, T25, SS, Cb, Ta)

467-Q. (Book.) **Creep and Fracture of Metals at High Temperatures.** 419 p. 1956. Her Majesty's Stationery Office, York House, Kingsway, London, England. W.C. 2. $3.32.

Compilation of reports covering studies of plastic deformation and fracture. Pertinent papers abstracted separately. (Q3, Q26)

468-Q. (Book.) **High Temperature Properties of Materials.** Joseph Marin, editor. 92 p. 1954. Department of Engineering Mechanics, Pennsylvania State University.

Five papers, separately abstracted, presenting information relevant to recent industrial and military developments requiring materials to be used at extremely high temperatures. (Q general)

469-Q. (Book.) **Symposium on Metallic Materials for Service at Temperature Above 1600° F.** ASTM Special Technical Publication No. 174. 193 p. 1955. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. $3.50; to Members, $2.65.

Fourteen papers, separately abstracted, report progress of a wide variety of approaches to the problem of ultra-high-temperature strength. (Q general, SG-h)

470-Q. Effects of Section Size Variations in a Test Casting on Properties of Some Mg-Al-Zn Alloys. W. E. Pearson. *American Foundrymen's Society, Preprint No.* 56-63, 1956, 9 p.

Alloys studied in the T4 condition include a series of 16 containing 5 to 9% Al, 0.0 to 1.0% Zn and 0.2% Mn. Slope casting is shown to be useful in alloy development, heat treatability, grain size and porosity tendency studies. Diagram, graphs, photograph, tables. 17 ref. (Q general, E general, Mg)

471-Q. Hot Tearing Characteristics of Acid and Basic Steel Castings Determined by High Temperature Testing. C. F. Christopher. *American Foundrymen's Society, Preprint No.* 56-171, 1956, 15 p.

Study of the high-temperature dynamic properties of a series of steels varying in chemical composition and methods of manufacture. Graphs, micrographs, photographs, tables. (Q23, CI)

472-Q. The Application of a New Structural Index to Compare Titanium Alloys With Other Materials in Airframe Structures. L. R. Jackson and S. A. Gordon. *American Society of Mechanical Engineers, Paper No.* 56-AV-10, 1956, 17 p.

Data on simple structural elements made from titanium alloys may not only be used to weld the behavior of alloy components to the background of experience on conventional materials but also to make the first steps toward the prediction of behavior that might be expected at high temperatures. Diagrams, graphs, tables. (Q general, T24, Ti)

473-Q. On the Relations Between Various Laboratory Fracture Tests. E. M. Lape and J. D. Lubahn. *ASME, Transactions*, v. 78, May, 1956, p. 823-833; disc., p. 833-835.

Notched and unnotched tensile tests, notched and unnotched bend tests, notched and unnotched disk-bursting tests and Charpy impact tests examined with the objective of finding correlations. Diagrams, photographs, graphs, tables. 18 ref. (Q26)

474-Q. The Tensile Properties of Uranium in the Inelastic Range of Stress. Robert W. Lewis and Glenn Murphy. *Ames Laboratory (U. S. Atomic Energy Commission)*, ISC-527, June 1954, 33 p.

Uranium was subjected to tensile tests in which the parameters of temperature, strain rate and load cycling are varied to determine the

influence of each on the strain hardening properties. Tables, graphs. 16 ref. (Q27, U)

475-Q. Development of Zirconium Alloys. I. A. D. Schwope, L. L. Marsh and W. Chubb. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* BMI-79, Aug. 1951, 22 p.

Small additions of molybdenum, tantalum, tin, titanium and nitrogen appreciably increase the high-temperature tensile strength of zirconium. Graphs, tables. (Q27, Zr)

476-Q. Notched-Bar Impact Testing of Uranium. S. J. Paprocki and H. A. Saller. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* BMI-753, June 1952, 22 p.

Specimens possessing five different heat treatment histories were tested over the range from −100 to 300° F. Behavior was comparable with hot rolled Monel or Inconel. Photographs, table, graphs. 22 ref. (Q6, U)

477-Q. Mechanical Properties of Ternary Zirconium Alloys. A. D. Schwope and W. Chubb. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* BMI-818, Apr. 1953, 24 p.

Tensile properties, hot hardness, corrosion resistance and heat treating characteristics were investigated in the search for alloys having good high-temperature strength. Tables. (Q27, Q29, R general, J general, Zr)

478-Q. Stress in Electrodeposited Coatings. Its Significance and Measurement. II. Joseph B. Kushner. *Metal Finishing,* v. 54, May 1956, p. 58-63.

Effect of plating variables on stress excess energy theory, hydrogen theory, hydrate theory, methods for measuring stress. Graphs, photographs. 14 ref. (Q25)

479-Q. A Nomograph for Strain Conversion. F. Forscher. *Metal Progress,* v. 69, May 1956, p. 80-B, 96, 98.

Chart may be used to convert different ductility measurements without calculation. Graph. (Q23, Q27)

480-Q. Prestressing an Ultra High-Strength Steel to Perform Even Higher Duty. Jerome W. Kaufman. *Metal Progress,* v. 69, May 1956, p. 87-90.

A small ordnance forging made of high-strength steel which was failing in service was successfully replaced with another of identical design but made of an ultra high-strength steel heat treated to about 283,000 psi. tensile ultimate. Diagrams. (Q general, G23, AY)

481-Q. Choice of High-Temperature Alloys. Influence of Fabrication History. Nicholas J. Grant. *Metal Progress,* v. 69, May 1956, p. 81-86.

Most important is the crystalline condition and its stability. An alloy whose crystals can absorb the maximum amount of deformation (with resulting strengthening) and retain this without recrystallization to the highest temperature will probably have the highest rupture strengths. Graphs, tables.
(Q general, N5, SG-h)

482-Q. Creep of Vanadium-Bearing Steels. (Digest of "The Effect of Vanadium Upon the Creep Strength of Low-Alloyed Steels for Tubes", by O. L. Bihet, Joint Metallurgical Societies Technical Session in Liege, Belgium, June 13, 1955, 13 p.) G. F. Comstock. *Metal Progress,* v. 69, May 1956, p. 141-142.

Testing of vanadium-bearing steels of varying composition, heat treating, properties. (Q3, AY)

483-Q. Effect of Cyclotron Irradiation on Creep of Aluminum. H. P. Yockey, M. R. Jeppson and R. D. Keen. *North American Aviation, Inc. (U. S. Atomic Energy Commission),* NAA-SR-121, June 1951, 30 p.

Irradiation with alpha particles of 38 m.e.v. yields data from which the plastic properties of aluminum in high-flux reactors may be predicted. Photographs, diagrams, table, graphs. 15 ref. (Q3, Al)

484-Q. Hot Hardness of Some Binary Molybdenum Base Alloys. Egon Pipitz. *Powder Metallurgy Bulletin,* v. 7, Apr. 1956, p. 146-148.

Experimental work on the hot hardness of the most important molybdenum alloys. Graphs. 3 ref. (Q29, Mo)

485-Q. The Mechanics of Quasi-Static Plastic Deformation in Metals. R. Hill. Paper from "Surveys in Mechanics". Cambridge University Press. p. 7-31.

Deformation of single crystals, plastic behavior of crystalline aggregates, continuum mechanics and the plastic-rigid model. Graphs, diagrams. 80 ref. (Q24)

486-Q. (German.) **Effect of Load Rate in Tensile Test on Construction of Stress-Strain Diagram.** F. Fischer. *Metall,* v. 10, nos. 9-10, May 1956, p. 419-423.

Discussions are limited to soft steels since there the phenomena are most significantly expressed. The same principles could be applied to nonferrous metals. Graphs. 28 ref. (Q27, CN)

487-Q. (Japanese.) **Study on the Hot Working Properties of Rimmed Steel. II.** Toshio Ikeshima and Tatsuaki Morishima. *Iron and Steel Institute of Japan, Journal,* v. 41, no. 4, Apr. 1956, p. 430-435.

The chemical compositions of black spots were analyzed and their microstructures examined. Hot working properties of steel containing the same amount of sulfur as that of the black spots were investigated by impact-bending and tensile tests at high temperatures. Graphs, photograph, micrographs, tables. 6 ref. (Q23, Q6, Q27, ST)

488-Q. The Creep of Zirconium in Water From 400° to 600° F. D. R. Brunstetter, N. P. Kling and B. H. Alexander. *Sylvania Electric Products, Inc. (U. S. Atomic Energy Commission),* SEP-54, Apr. 1951, 17 p.

Secondary creep, limiting creep stress and total elongation determined in 2000-hr. tests. Diagram, graphs, tables. 2 ref. (Q3, Zr)

489-Q. Investigation of the Influence of Deoxidation and Chemical Composition on Notched-Bar Properties of Ship Plate Steels. F. W. Boulger, R. H. Frazier and C. H. Lorig. *Welding Research Council Bulletin Series,* No. 26, Apr. 1956, 18 p.

Result of an investigation of some 400 heats of steel to determine the effects of variations in composition and deoxidation practice on the fracture characteristics of ship plate steel. Graphs, tables. 31 ref. (Q23, Q26, ST)

490-Q. (Russian.) **On Ways of Increasing the Static Strength of Welded Joints Working in Low-Temperature Conditions.** V. I. Novikov. *Avtomaticheskaia Svarka,* v. 9, no. 1, Jan.-Feb. 1956, p. 47-57.

Experiments investigating the influence of mechanical treatment of seams, of local heat treatment and of local cold hardening of welded joints on their static strength at low temperatures. Tables, diagrams, graphs, photograph. 15 ref. (Q23, K1, J general)

491-Q. (Japanese.) **Studies on the Hot-Working Strength of Steel. I. The High-Temperature-High Speed Tension Testing Machine.** Katsuro Inouye. *Iron & Steel Institute of Japan, Journal,* v. 41, no. 5, May 1956, p. 506-515.

Design and construction of the testing machine, together with a suitable experimental technique. Both nominal stress-strain curve and true-stress natural strain curve in all deforming conditions of all types of steels are obtained. Diagrams, graphs, photograph, table. 11 ref. (Q27, ST)

492-Q. (Russian.) **Loss of Tensile Strength in Cast Steel.** O. V. Stupishina and V. I. Likhtman. *Doklady Akademii Nauk SSSR,* v. 107, no. 2, Mar. 11, 1956, p. 252-254.

Effect of micro and macroporosity of cast steels of different hardness on their strength and plasticity during tension. Yield point and other values. Relation between hardness, brittleness and strength. Table, graphs. (Q23, Q29, CI)

493-Q. (Russian.) **On the Correlation Between Indentation Hardness and Modulus of Normal Elasticity of Pure Metals at Higher Temperatures.** M. G. Lozinskii and S. G. Fedotov. *Izvestiia Akedemii Nauk, SSSR, Otdelenie Teknicheskikh Nauk,* no. 3, Mar. 1956, p. 59-67 + 2 plates.

Experimental data on hardness of several pure metals (platinum, palladium, rhodium, iridium, tungsten, molybdenum, titanium, zirconium, iron, nickel, cobalt, copper and silver) are construed to prove that the main part in the resistance to plastic deformation at higher temperatures is played by the strength of interatomic bonds, best characterized by the modulus of elasticity rather than by melting temperatures. Tables, graphs, micrographs. 10 ref. (Q21, Q29)

494-Q. (Russian.) **Temper Brittleness of Chromium-Nickel-Manganese Steel in Relation to Additional Alloying of the Steel.** M. P. Braun and E. E. Maistrenko. *Metallovedenie i Obrabotka Metallov,* no. 3, Mar. 1956, p. 28-33.

Effect of alloy additions of titanium, vanadium, tungsten, molybdenum and columbium to two groups of steel. Relation of impact toughness to tempering temperature and rate of cooling. Tables, graphs. 7 ref. (Q23, Q6, AY)

495-Q. (Russian.) **Hardness of Steel, Quench-Hardened After Induction Heating.** I. Ia. Gorbul'skii. *Metallovedenie i Obrabotka Metallov,* no. 3, Mar. 1956, p. 34-37.

Attempts to provide empirical formulas for calculating hardness of quench-hardened layer. Relation between quantity of carbon and hardness. Does not take into account the heating-time factor. Tables, graph. 8 ref. (Q29, J2, ST)

496-Q. (Russian.) **Wear Resistance of Quench-Hardened Steel Using the Usual Type of Heating and Induction**

Heating. G. A. Preis. *Metallovedenie i Obrabotka Metallov,* no. 3, Mar. 1956, p. 47-50.

Relation of microhardness of surface layer to tempering temperature. Comparative wear and friction tests (without lubrication or with poor lubrication). Graphs, diagram. 8 ref. (Q9, J26, Q29, J2, ST)

497-Q. (Russian.) **Mechanical Properties of Steel EI579 After Prolonged Heating at 550 and 700°.** E. I. Uriupina. *Metallovedenie i Obrabotka Metallov,* no. 3, Mar. 1956, p. 52-55.

Effect of tempering and quench-hardening procedures and temperatures on mechanical properties. Phase analysis, including presence of vanadium carbide. Tables, graphs. (Q general, J26, J29, ST)

498-Q. (Russian.) **Improving the Quality of Thick Sheet Mild Steel by Simpler Types of Heat Treatment.** V. A. Konopasevich. *Metallovedenie i Obrabotka Metallov,* no. 3, Mar. 1956, p. 55-59.

Impact toughness and microstructure after normalizing and tempering, quench hardening and rolling. Impact toughness in the zone affected by welding, in quench hardened and normalized steels. Micrographs, tables, graphs. (Q6, M27, J general ST)

499-Q. (Russian.) **Methods for the Analysis of Fatigue Cracks.** A. M. Zaitsev. *Zavodskaia Laboratoriia,* v. 22, no. 4, Mar. 1956, p. 472-478.

Survey of methods. Nature, structure and causes of fatigue cracking, including "brittle slip", zone differences and microcracks. Micrographs, photographs. 6 ref. (Q7)

500-Q. (Russian.) **Effect of Ternary Metallic Compound E(AlCrMg) on the Heat Resistance of Aluminum Alloys.** B. K. Vul'f and M. N. Chernov. *Zhurnal Neorganisheskoi Khimii,* v. 1, no. 1, 1956, p. 158-162 + 1 plate.

Hardness of the ternary compound at 20 and 300° C. Effect of this compound and its proportion in composition on the short-term strength and long-term strength of aluminum alloys at 300° C. Microhardness and microstructure after pressing and heat treatment. Micrographs, diagrams, tables, graphs. 11 ref. (Q23, Q29, M27, Al)

501-Q. (Spanish.) **Low-Temperature Brittleness Tests and Determination of the Transition Zone in Steels.** Francisco Cacho Falco and Jorge Barrenechea Aberasturi. *Instituto del Hierro y del Acero,* v. 9, no. 44, Mar. 1956, p. 306-314.

Study of the dependence between the transition temperature of brittleness of carbon steels and their carbon and manganese contents. Tables, graphs, micrographs. 5 ref. (Q23, ST, Mn)

502-Q. The Creep Properties of Thorium. A. D. Schwope, L. L. Marsh and F. R. Shober. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* BMI-866, Sept. 1953, 15 p.

Results indicate that design considerations for the use of thorium under cyclic load conditions in the temperature range from 200 to 600° F. should be based largely on fatigue strength rather than on creep strength. Tables, graphs. 3 ref. (Q3, Q7, Th)

503-Q. Metallurgical Requirements of Metals for Steam Service Above 1000° F. F. B. Foley and R. M. Wilson, Jr. *Blast Furnace and Steel Plant,* v. 44, May 1956, p. 508-512.

Requirements and attempts to indicate directions in which some of the inherent problems may find a solution. Diagrams, graph, tables. (Q23, T25, ST)

504-Q. Fatigue Tests on End Closures for Model Headers. P. H. R. Lane. *British Welding Journal,* v. 3, May 1956, p. 200-205.

Pulsating pressure fatigue tests on a number of designs for end closures for 6-in. diam., mild steel pipe. Photographs, graph, tables, diagrams. 3 ref. (Q7, K1, ST)

505-Q. Processing Under Extreme Conditions. Effects of Hydrogen on Properties of Metals. D. D. Perlmutter and B. F. Dodge. *Industrial and Engineering Chemistry,* v. 48, May 1956, p. 885-893.

Over 50 specimens were exposed to hydrogen gas atmospheres at pressures between 7500 and 60,000 psi. at room temperature and to pressures of 15,000 and 30,000 psi. at temperatures up to 500° C. with exposure time varying between 6 hr. and 60 days. Graphs, diagrams, tables. 52 re. (Q23, N1)

506-Q. Full-Scale Fatigue Tests of Diesel Engine Elements. P. E. Wiene. *Institute of Marine Engineers, Transactions,* v. 68, Mar. 1956, p. 39-46; disc., p. 47-59.

Rotary bending tests, springs, cast iron, notch snarpness, tension-compression tests, crankshafts, piston rods, shrunk joints, welded elements. Photographs, graphs, diagrams, tables, micrographs. 3 ref. (Q7, S21, CI, ST)

507-Q. At Elevated Temperatures Low Carbon, Low Nitrogen Improve

Stainless Properties. F. C. Monkman and N. J. Grant. *Iron Age,* v. 177, May 31, 1956, p. 67-70.

Effects of vacuum melting on uniformity, strength and stability of stainless steels. Graphs, tables. (Q general, D8, SS)

508-Q. Physics of Solids—Plastic Flow. Pol Duwez. *Journal of the Aeronautical Sciences,* v. 23, May 1956, p. 435-437, 468.

Plastic flow and fracture under combined stresses; theory of specific heat of solids; propagation of plastic deformation in solids. Photograph. 12 ref. (Q24, Q26)

509-Q. Fiber Textures in Uranium. Anna M. Turkalo, J. E. Burke and A. N. Holden. *Knolls Atomic Power Laboratory (U. S. Atomic Energy Commission), KAPL-*428, Aug. 1950, 17 p.

Fiber textures produced in a series of uranium rods, each of which was swaged at a different temperature from room to 600° C. explained in terms of crystallographic mechanisms of deformation. Table, micrographs, diagrams. 9 ref. (Q24, U)

510-Q. Remote Operating "Tukon" Hardness Tester. E. R. Craig and R. F. Stearns. *General Electric Company, Knolls Atomic Power Laboratory (U. S. Atomic Energy Commission), KAPL-*1523, Dec. 1955, 13 p. + 6 plates.

Apparatus for determining micro and macrohardness utilizes a closed circuit television system to bring the microscope image to the outside of a shielded cell. Photographs, diagram. (Q29)

511-Q. Metals for Low Temperatures. Allan L. Tarr. *Machine Design,* v. 28, May 31, 1956, p. 111-116.

Factors affecting metal failure. Mechanical properties of steels and nonferrous alloys. Table, graphs. (Q general, ST, EG-a)

512-Q. The Presentation of Fatigue Data for Fatigue Life Calculations. C. L. Bore. *Royal Aeronautical Society, Journal,* v. 60, May 1956, p. 331-346.

A simple and convenient "endurance chart" for the presentation of basic fatigue data which shows the effects of mean stress, residual stress and pre-tension, and displays several interesting features of the data. Tables, graphs, diagrams. 10 ref. (Q7)

513-Q. Elevated-Temperature Fatigue Properties of Two Titanium Alloys. William K. Rey. *U. S. National Advisory Committee for Aeronautics, Research Memorandum* 56B07, Apr. 1956, 28 p.

Unnotched fatigue properties investigated at temperatures up to 1000° F. Tables, photograph, diagram, graphs. 1 ref. (Q7, Ti)

514-Q. Effect of Residual Stresses in Surface of Metals Upon Wear Resistance. P. E. D'yachenko and T. V. Smushkova. *Henry Brutcher Translation No.* 3713, 7 p. (Condensed from *Vestnik Mashinostroeniya,* v. 35, no. 3, 1955, p. 38-40) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 510-Q, 1955. (Q9, Q25, ST, CI)

515-Q. (English.) **Slip in Crystals of the Caesium Chloride Type.** W. A. Rachinger and A. H. Cottrell. *Acta Metallurgica,* v. 4, no. 2, Mar. 1956, p. 109-113.

Experiments made with various single crystals, the conventional method of slip traces and the prismatic punching method of Smakula and Klein being used to determine the glide elements. Table, micrograph. 13 ref. (Q24)

516-Q. (English.) **The Influence of Hydrogen on the Yield Point in Iron.** H. C. Rogers. *Acta Metallurgica,* v. 4, no. 2, Mar. 1956, p. 114-117.

Two related mechanisms for the suppression of the yield point in iron by hydrogen discussed. Graphs. 2 ref. (Q23, Fe)

517-Q. (English.) **The Temperature Dependence of the Elastic Constants of Gold-Cadmium Alloys.** Stanley Zirinsky. *Acta Metallurgica,* v. 4, no. 2, Mar. 1956, p. 164-171.

Temperature dependence of the dynamic elastic constants of body-centered cubic alloys that undergo diffusionless phase change determined as a function of composition variation within the beta phase, and heat treatment prior to measurement. Graphs, diagrams, tables, 23 ref. (Q21, Au, Cd)

518-Q. (English.) **Propagation of Lüder's Bands in Steel Wires.** J. C. Fisher and H. C. Rogers. *Acta Metallurgica,* v. 4, no. 2, Mar. 1956, p. 180-185.

Annealed steel wires were deformed at constant load by hanging weights on the wires. Propagation was observed visually through the cracking of a brittle lacquer coating. Graphs, diagram. 8 ref. (Q23, Q25, ST)

519-Q. (English.) **The Critical Shear Stress in α-Brass as a Function of**

Zinc Concentration and Temperature. R. E. Jamison and F. A. Sherrill. *Acta Metallurgica,* v. 4, no. 2, Mar. 1956, p. 197-200.

Single-crystal tensile specimens of α-brass of various compositions up to 30 at. % zinc were pulled at four temperatures to measure the critical shear stress. Table, graphs. 15 ref. (Q2, Zn)

520-Q. (English.) **An Electron Diffraction Study on the Plastic Deformation of Aluminium Single Crystals.** Kazuo Kimoto. *Physical Society of Japan, Journal,* v. 11, no. 5, May 1956, p. 485-495.

Plastic deformation studied through Kikuchi lines of electron diffraction by the large angle convergent beam method. Diffractograms, diagrams, table. 21 ref. (Q24, Al)

521-Q. (English.) **Study of Plastic Deformation in Aluminium Crystals by Electron Diffraction and Electron Microscopy.** F. E. Fujita, D. Watanabe, M. Yamamoto and S. Ogawa. *Physical Society of Japan, Journal,* v. 11, no. 5, May 1956, p. 502-515.

Suitably oriented single crystals subjected to tensile deformation of various amounts investigated by electron diffraction together with ordinary microscopy, interferometer microscopy and electron microscopy. Graph, tables, diagrams, micrograph, diffractograms. 10 ref. (Q24, M21, M22, Al)

522-Q. (English.) **Intersection of (301), (101) Twin Bands in Tin.** Saiyu Maruyama and Hiroshi Kiho. *Physical Society of Japan, Journal,* v. 11, no. 5, May 1956, p. 516-521.

An interpretation for the mechanisms of additional twinning processes obtained from the results of shear strain measurements around intersections. Micrographs, tables, diagrams. 10 ref. (Q24, Q6, Q2, Sn)

523-Q. (German.) **Residual Stress of Unstable Austenite Manganese Steels From Thermal Treatment.** Hans Bühler and Elmar Herrmann. *Archiv für das Eisenhüttenwesen,* v. 27, no. 4, Apr. 1956, p. 269-274.

Residual stress and hardness investigations of hard manganese steel with 1.2% carbon and 13.6% manganese at different rates of thermal treatment. Graphs, diagram. 10 ref. (Q25, Q29, AY)

524-Q. (Italian.) **Influence of Iron and Silicon Contents on the Fatigue Resistance of Ergal.** F. Gatto, *Alluminio,* v. 25, no. 4, Apr. 1956, p. 175-186; disc., p. 186.

Influence of different iron and silicon contents on the fatigue resistance under rotative bending stress of Ergal-type alloys. More alloying decreases the resistance to fatigue. Tables, graphs, diagrams, micrographs, photographs. 8 ref. (Q7, Al)

525-Q. (Italian.) **Results of Practical Service Tests Carried Out on Aluminum-Tin-Base Antifriction Light Alloys.** N. Collari and L. Paglialunga. *Alluminio,* v. 25, no. 4, Apr. 1956, p. 187-191.

Three alloys were tested; one with the highest tin content was best. Tables, graph, diagrams, micrographs, photographs. 4 ref. (Q9, Al, Sn)

526-Q. (Italian.) **Principal Corrective Elements for Cast Iron and Steel. Their Influence and Use.** *Fonderia,* v. 5, no. 4, Apr. 1956, p. 189-194.

Use of molybdenum and nickel for improving the properties of cast iron and steel. (To be continued.) (Q general, Mo, Ni, CI)

527-Q. (Russian.) **Effect of Certain Processes of Heat Treatment on the Tendency to Delayed Fracture of Steel With a Yield Point of 120-140 Kg. Per Sq. Mm.** L. M. Pevzner, V. E. Sadovskii, T. K. Zilova, S. S. Volkov and Ia. M. Potak. *Metallovedenie i Obrabotka Metallov,* no. 3, Mar. 1956, p. 5-14.

Effect of conditions of tempering and annealing on tendency to brittle fracture under action of hydrogen and stresses. Role of heat treatments, coatings, microhardness and structure in delayed fracture of bolts under prolonged strain in skewed or over-tightened condition. Tables, graphs. 11 ref. (Q23, Q26, J general, AY)

528-Q. (Russian.) **Effect of Residual Austenite, Obtained by Quench Hardening, on the Impact Toughness and Type of Fracture in Highly Tempered Chromium-Nickel-Molybdenum Steel.** A. P. Guliaev and I. I. Slavina. *Metallovedenie i Obrabotka Metallov,* no. 3, Mar. 1956, p. 15-17.

Effect of cooling conditions on fibrous or crystalline fracture. Effect of tempering and quenching on residual austenite and the resulting increase of the critical temperature of brittleness and worsening of the type of fracture. Graphs, table. 2 ref. (Q6, Q26, Q23, J26, J29, AY)

529-Q. The Physical Meaning of Indentation and Scratch Hardness. D. Tabor. *British Journal of Applied Physics,* v. 7, May 1956, p. 159-166.

Indentation-hardness and scratch-hardness measurements of metals

and of minerals are essentially a measure of the plastic yield properties of the material under examination. Tables, graphs, diagrams. 15 ref. (Q29)

530-Q. A Photoelastic Method of Two-Dimensional Separation of Stresses Along a Line of Symmetry by Using the Isochromatic Fringes Only. S. P. Christodoulides. *British Journal of Applied Physics,* v. 7, May 1956, p. 190-194.

General expressions are established in which the equations of equilibrium are referred to any system of orthogonal curvilinear coordinates. Graph, diagrams, tables, photograph. 3 ref. (Q25)

531-Q. Some Metallographic Observations on the Fatigue Failure of Bare and Clad Aluminium-Copper-Magnesium Alloy Sheet. J. J. Sebisty and J. O. Edwards. *Institute of Metals, Journal,* v. 84, Apr. 1956, p. 291-297.

Form and extent of crack damage in the clad material was influenced by the thickness of the specimen, the stress and the number of cycles. With the bare material, fatigue damage was highly localized, since the first cracks to appear tended to be preferentially propagated to failure without the formation of additional cracks. Diagrams, tables, graphs. 7 ref. (Q7, Al)

532-Q. Slip-Band Extrusion. E. A. Calnan and Betty E. Williams. *Institute of Metals, Journal,* v. 84, Apr. 1956, p. 318 + 10 plates.

Electron micrographs of copper indicate the occurrence of slip-band extrusion in simple tensile deformation. This may be due to slip on parallel planes in different directions. Photographs, micrographs, diagrams. 1 ref. (Q24, Q27, Cu)

533-Q. The Properties of 2¼% Cr-1% Mo Steel. M. G. Gemmill and J. D. Murray. *Iron and Steel,* v. 29, May 1956, p. 173-177.

Welding and stress raisers as they affect the material's performance under service conditions. Graph, micrographs, diagram, tables. 7 ref. (Q25, AY)

534-Q. The Mechanical Properties of Carbon Steel Wire at Low Temperatures. R. W. Nichols. *Iron and Steel Institute, Journal,* v. 182, Apr. 1956, p. 337-347.

The effects of low temperature on the tensile, fatigue and reverse-bend strength of steel wire, and the influence of electrogalvanizing on these properties. Micrographs, photograph, graphs, diagram, tables. 15 ref. (Q general, L17, Zn, CN)

535-Q. The Hardness of Some Carbon and Low-Alloy Steels at Low Temperatures. R. W. Nichols. *Iron and Steel Institute, Journal,* v. 182, Apr. 1956, p. 348-354.

Diamond pyramid and ball-hardness tests were made at + 18, − 70, and − 196° C. on light steels for which the low-temperature tensile properties had been determined. Graphs, tables, diagram. 9 ref. (Q29, CN, AY)

536-Q. Stress-Strain Curves of Some Metals and Alloys at Low Temperatures and High Rates of Strain. H. G. Baron. *Iron and Steel Institute, Journal,* v. 182, Apr. 1956, p. 345-365.

Comparative tensile tests were carried out on some common engineering metals and alloys. Graphs, diagram, table, micrographs, oscillograms. 32 ref. (Q27, Al, Cu, ST)

537-Q. Effect of Phosphorus Content on Impact Value of Fully and Partially Hardened and Tempered Mn-Mo Steels. N. P. Allen and C. C. Earley. *Iron and Steel Institute, Journal,* v. 182, Apr. 1956, p. 375-388.

Steels, after tempering, showed a progressive rise of impact transition temperature with increase of phosphorus content, but the impact transition temperatures of the fully hardened steels were consistently lower than those of the corresponding partially hardened steels. Micrographs, graphs, tables. 7 ref. (Q6, AY)

538-Q. Stress Theory of Plastic Flow. D. Trifan. *Journal of Mathematics and Physics,* v. 35, Apr. 1956, p. 44-52.

Mathematical theory of plastic flow for incompressible, isotropic, strain-hardening materials exhibiting a gradual transition from the elastic to the plastic state. Graph. 17 ref. (Q24)

539-Q. Deformations of an Elastic-Plastic Cylindrical Shell With Linear Strain Hardening. P. G. Hodge, Jr., and F. Romano. *Journal of the Mechanics and Physics of Solids,* v. 4, May 1956, p. 145-161.

Complete solution is obtained directly from the governing equations. Various limiting cases are considered, including elastic, perfectly plastic and rigid strain hardening. Results are applied to an example, and salient features are shown graphically. Graphs. 8 ref. (Q24, Q25)

540-Q. On Conjugate States of Plane Strain. W. Prager. *Journal of the Mechanics and Physics of Solids,* v. 4, May 1956, p. 167-171.

Duality principle applies quite generally to pairs of incompressible

solids such that the relation between the stresses and the strains in one solid has the same mathematical structure as the relation between the strains and the stresses in the other. Diagrams. 1 ref. (Q25)

541-Q. The Tearing of Aluminium Foils. J. Hennephof. *Journal of the Mechanics and Physics of Solids,* v. 4, May 1956, p. 172-183.

The energy for tearing a unit length out of the foil consists of the energy for bending the foil and the energy for the plastic deformation of the borders of the tear. Table, graphs, diagrams. 1 ref. (Q26, Al)

542-Q. Associated Problems in Two-Dimensional Elasticity. J. E. Adkins. *Journal of the Mechanics and Physics of Solids,* v. 4, May 1956, p. 199-205.

A method for the simultaneous solution of two or more problems, with analytically similar boundary conditions, in two-dimensional elasticity. 9 ref. (Q21)

543-Q. Low-Temperature Fatigue Testing of Copper. *Metallurgia,* v. 53, no. 319, May 1956, p. 212-213, 216.

Both fatigue resistance and ultimate tensile strength increased at low temperatures. Table, graph, photographs. (Q7, Cu)

544-Q. Creep and Stress-Rupture Tests on Molybdenum-Vanadium Weld Metal and Welds in Molybdenum-Vanadium Steel Using Vanadium-Bearing Electrodes. R. P. Kent. *Metal Treatment and Drop Forging,* v. 23, May 1956, p. 193-202.

Creep and rupture properties of weld metal compared with those of the parent metal in the normalized and tempered condition. Graphs, diagram, tables. 6 ref. (Q3, Q4, K9, AY)

545-Q. Thermal Fatigue Testing of Sheet Metal. H. E. Lardge. *Sheet Metal Industries,* v. 33, no. 349, May 1956, p. 299-306.

Test is based on heating a test specimen with a central hole to 1650° F. and then cooling it rapidly in a blast of cold air. Micrographs, diagrams, tables, photograph, graphs. (Q7)

546-Q. Repeated Load Tests of Forged 75S-T6 Aluminum Alloy Specimens With Protruding Lugs. Darnley M. Howard. *U. S. Department of Commerce, National Bureau of Standards,* NBS Report 4051, May 1955, 37 pages.

Fatigue strength decreased as lug width increased and fillet radii decreased. Lug height had no effect. Tables, photographs, graphs. 7 ref. (Q7, Al)

547-Q. Elevated-Temperature Fatigue Properties of Two Titanium Alloys. William K. Rey. *U. S. National Advisory Committee for Aeronautics, Research Memorandum* NACA RM 56B07, Apr. 1956, 28 p.

Test results presented in tabular form and as curves of stress versus cycles to failure for each test temperature. Tables, photograph, graphs, diagram. 1 ref. (Q7, Ti)

548-Q. Report on Elevated Temperature Properties of Titanium. W. Lee Williams. *U. S. Naval Engineering Experiment Station, Report 4A(2)-066876 NS-013-118,* Oct. 1951, 7 pages + 5 plates.

Tensile, creep and stress-rupture properties are reported up to 900° F. for both annealed and cold worked unalloyed titanium produced from a single ingot arc melted in graphite. Tables, graphs. 3 ref. (Q27, Q3, Q4, Ti)

549-Q. Notch Ductility of Weld Metal. William S. Pellini. *Welding Journal,* v.35, May 1956, p. 217s-233s.

Role of weld metal notch ductility in determining the performance of weldments. Photographs, table, graphs, diagrams. 20 ref. (Q23, K9, ST)

550-Q. Effect of Annealing (650° C.) on Bending Fatigue of Large Welding Test Pieces. P. E. Wiene. *Welding Journal,* v. 35, May 1956, p. 261s-264s.

Annealing of heavy engine parts after welding was found to be justified because of the resultant increase in bending fatigue strength. Graphs, diagrams, tables. 6 ref. (Q7, J23, ST)

551-Q. Mechanical Properties Evaluation of Zircaloy-3. F. Forscher. *Westinghouse Electric Corporation, Bettis Plant (U. S. Atomic Energy Commission),* WAPD-143, Mar. 1956, 47 p.

Strength, ductility, impact resistance and hardness of the three tentative Zircaloy-3 compositions compared to Zircaloy-2 properties at several temperatures and heat treatment conditions. Tables, diagrams, micrographs, graphs. 8 ref. (Q general, Zr)

552-Q. (French.) Remarks on the Relationship Existing Between Tensile Strength, Modulus and Hardness in Low-Phosphorus Unalloyed Gray Cast Irons. Michel Ferry. *Fonderie,* no. 123, Apr. 1956, p. 143-150.

Investigates dependence of the modulus of elasticity and hardness on structure of graphite and the matrix. Tables, graphs. 13 ref. (Q21, Q29, Q27, CI)

553-Q. (French.) **Shrinkage Phenomenon During a Tensile Stress Test on Tubes.** H. de Leiris. *Revue de Métallurgie,* v. 53, no. 1, Jan. 1956, p. 37-47.

Distance between marks on circular-section tubes must be proportional to the outside diameter. Diagrams, graphs, photographs, tables. (Q27)

554-Q. (French.) **Structure Alterations of Aluminum Under the Double Effect of Distortion and Annealing.** F. Provost. *Revue de Métallurgie,* v. 53, no. 1, Jan. 1956, p. 63-66.

Samples of commercial aluminum were submitted to hot rolling tests with intermediate annealing periods of varying length; texture variations observed. Graphs, micrographs, photographs. (Q24, Al)

555-Q. (French.) **Disorganization and Cold Restoration of Aluminum Monocrystals Subjected to Small Tensile Stresses.** Jules Caisso. *Revue de Métallurgie,* v. 53, no. 1, Jan. 1956, p. 57-62.

Disturbances in the texture of aluminum monocrystals resulting from tensile stresses studied by a long-distance focalization method. Graphs, photographs. 7 ref. (Q24, N5, Al)

556-Q. (French.) **A Comparative Study of the High-Temperature Strength of Some Industrial Alloys Mainly Constituted of Magnesium.** J. Le Gall and G. Sertour. *Revue de Métallurgie,* v. 53, no. 4, Apr. 1956, p. 241-247.

General survey of tensile and creep tests on magnesium-aluminum, magnesium-zinc-rare earth, magnesium-rare earth and magnesium-thorium alloys. Mechanical characteristics and uses. Graphs, micrographs. (Q3, Q27, Mg)

557-Q. (French.) **Some Observations on Residual Stresses in Light Alloy Quenched Pieces as a Function of the Cooling Conditions.** M. Tournaire and M. Renouard. *Revue de Métallurgie,* v. 53, no. 4, Apr. 1956, p. 255-259; disc., p. 259-262.

Tests on press-extruded duralumin bars showed no satisfactory quench process; hot-water quench gave best results. Micrographs, graphs. (Q25, J26, Al)

558-Q. (French.) **Effects of Quenching and Tempering on Aluminum-Magnesium Alloys Containing, as Impurity or Secondary Constituent, Silicon in Proportions of 0 to 1%.** J. Rigal and M. Renouard. *Revue de Métallurgie,* v. 53, no. 4, Apr. 1956, p. 263-269; disc., p. 269-270.

Mechanical characteristics are strongly improved by quenching and tempering. Table, graphs. (Q general, J26, J29, Al)

559-Q. (French.) **The Development of Alloys Containing Mainly Nickel and Chromium for Use at High Temperature.** W. Betteridge and A. W. Franklin. *Revue de Métallurgie,* v. 53, no. 4, Apr. 1956, p. 271-284.

Influence of composition, structure and thermal treatment on creep properties. Important properties of commercial alloys. Tables, diagrams, micrographs, graphs. 13 ref. (Q3, SG-h, Cr, Ni)

560-Q. (German.) **New Methods for the Determination of Coefficients in Plastic Deformation.** Zygmunt Wusatowski. *Neue Hütte,* v. 1, no. 5, Mar. 1956, p. 275-279.

Derivation of general relations for plastic deformation processes. Diagrams, graph, tables. 4 ref. (Q24)

561-Q. (German.) **Tensile and Folding Tests of Fusion-Welded Butt Joints.** H. Fiehn and K. Teske. *Schweissen und Schneiden,* v. 8, no. 5, May 1956, p. 158-163.

Tensile tests of test bars. Effect of bending angle and bending strain in notch-folding tests. Influence of machining, bending mandrel diameter and thickness of specimen. Tables, graphs, photographs. 6 ref. (Q27, Q5, K9)

562-Q. (Polish.) **Effect of Hardening of White Cast Iron on Strength, Hardness and Structure of Pearlitic Malleable Cast Iron.** Mikolaj Dubowicki, Waclaw Sakwa, and Stefan Pieprznik. *Przeglad Odlewnictwa,* v. 6, no. 4, Apr. 1956, p. 97-103.

Testing of white cast iron (quench-hardened and nonquench-hardened) for tensile strength, microstructure and hardness before graphitizing. Effect of previous hardening on mechanical properties and microstructure of pearlitic malleable cast iron graphitized in an electric furnace. Micrographs, tables, graphs. (Q23, Q9, J26, M27, CI)

563-Q. (Russian.) **Measurement of Wear of Parts in an Engine by Means of Radioactive Isotopes.** D. I. Vysotskii and V. S. Zabel'skii. *Avtomobil'naia i Traktornaia Promyshlennost,* no. 4, Apr. 1956, p. 26-28.

Method, principles, measurement instruments. Graphs, diagrams. 3 ref. (Q9, S19, ST)

564-Q. (Russian.) **Static Strength of Longitudinal Butt and Lap Welded Joints.** B. F. Lebedev. *Avtomaticheskaia Svarka,* v. 9, no. 2, Mar.-Apr. 1956, p. 48-57.

Study of longitudinal butt and lap joints of openhearth and bessemer construction steels. Advantages of butt over lap joints. Diagrams, tables, photographs. 3 ref. (Q23, K9, ST)

565-Q. (Russian.) **Static Strength of Spot-Welded Joints.** A. N. Dorofeev. *Avtomaticheskaia Svarka,* v. 9, no. 2, Mar.-Apr. 1956, p. 58-67.

Theoretical analysis of a longitudinally spot-welded joint working in the elastic and the elastic-plastic ranges shows that the spots do not work uniformly. Findings are proved experimentally. Diagram, table, graphs. 12 ref. (Q23, K3)

566-Q. (Russian.) **Relaxation Resistance of Springs of Steel 50 KhFA and a Method for Increasing It.** I. N. Rochlin. *Teploenergetika,* v. 3, no. 5, May 1956, p. 40-42.

At temperatures above 300°C. this steel has low relaxation resistance, despite high yield point. Method of preloading to increase relaxation resistance for temperature of 300 to 350°C. Tables, graphs. 3 ref. (Q3, SG-b)

567-Q. (Spanish.) **Study of Brittleness of Cast Steels on U and V-Notch Charpy Test Pieces.** A. Audigé. *Ciencia y Técnica de la Soldadura,* v. 6, no. 29, Mar.-Apr. 1956, 8 p.

Results of tests conducted on unkilled, semikilled and killed steel specimens. Comparison with foreign tests. Tables, graphs. 7 ref. (Q23, Q6, ST)

568-Q. (Pamphlet.) **V-Notch Charpy Impact Testing of Weld Metal and Heat-Affected Zone Simultaneously.** William P. Hatch, Jr., and Carl E. Hartbower. Watertown Arsenal Laboratory Report No. WAL 401/220, Dec. 1955. 17 p.

Method for evaluating relative notch-toughness characteristics of weld metal and heat affected base metal in a natural environment. (Q6)

569-Q. (Book.) **Mathematical Theory of Elasticity.** I. S. Sokolnikoff. 2nd Ed. 476 p. 1956. McGraw-Hill Book Co., 330 W. 42 St., New York 36, N. Y.

Analysis of strain and stress; equation of elasticity; extension, torsion and flexure of beams; two and three-dimensional electrostatic problems; variational methods. (Q21)

570-Q. (Book.) **Surveys in Mechanics.** G. K. Batchelor and R. M. Davies, editors. 475 p. 1956. Cambridge University Press, Bentley House, N.W. 1, London, England.

Collection of surveys of present position of research in such subjects as deformation in metals, stress waves in solids, rotating fluids, drops and bubbles, atmospheric turbulence and mechanics of sailing ships and yachts. Pertinent papers abstracted separately. (Q general)

571-Q. (Book-English.) **Evaluation of a Method for Determining the Tendency of Mild Steel to Brittle Fracture.** Report No. SR 532/1 A. 2nd Ed. 99 p. 1955. Centrum voor Lastechniek N.V.L.-T.N.O., The Hague, Netherlands.

Numerous tests, both dynamic and static, carried out on various types of impact and notch-bend specimens at different temperatures. (Q26, Q5, Q6, ST)

572-Q. Buckling of Columns in the Presence of Creep. Sharad A. Patel. *Aeronautical Quarterly,* v. 7, May 1956, p. 125-134.

Instantaneous elastic and plastic deformations, as well as transient and secondary creep, are considered. Formulas for the critical time at which a column fails are presented for integral values of the exponents appearing in the creep law. Table, graphs, diagram. 8 ref. (Q3)

573-Q. The Growth of Fatigue Cracks. A. K. Head. *Commonwealth of Australia, Dept. of Supply, Aeronautical Research Laboratories, Report no.* MET. 5, July 1954, 48 p.

A theoretical analysis for the growth of a fatigue crack based on an idealized form of crack indicates that it would be quite feasible for the fatigue crack to have been growing during most of the fatigue life. Graphs, diagrams. 40 ref. (Q7, Q26)

574-Q. Brazed Titanium Lap Joint. Mechanical Properties. Oxy-Acetylene Torch Heated. L. D. Girton. *Convair, Report No.* 8333, Jan. 1955, 7 p.

Shear strength and ductility of joints brazed with fine silver, 52S aluminum, and 70% zinc, 30% silver alloy. Penetration depth of fine silver and 52S aluminum into joints. Diagrams, tables. (Q2, Q23, K8, Ti)

575-Q. Effect of Hydrogen on Stretching of Titanium. W. L. Moore and L. F. Vobeyda. *Convair, Report No.* 9280, Mar. 1955, 13 p.

The variation of elongation in long strip specimens of three titanium materials when stretched to failure. Micrographs, graphs, tables. (Q23, Ti)

576-Q. Silver Brazed Titanium Alloys. Mechanical Properties. Torch and Furnace Heated. A. J. Brothers and L. D. Girton. *Convair, Report No.* 9371, Apr. 1955, 10 p.

Torch and furnace brazing characteristics; wettting and flowing characteristics of fine silver melted on titanium in argon. Diagrams, tables. (Q general, K8, Ag, Ti)

577-Q. Metallurgical Examination of Titanium Alloy Part, 8-73702, Broken During Machining. H. C. Turner. *Convair, Report No.* 9459, Nov. 1955, 11 p.

No definite metallurgical cause of failure was established. Table, photographs, micrographs. (Q26, Ti)

578-Q. Annealing of Titanium Alloy Extrusion RS-140X. H. C. Turner. *Convair, Report No.* 9760, Aug. 1955, 3 p.

Effect of annealing on the tensile properties of ⅝-in. round RS-140X titanium extruded bar. Table. (Q27, J23, Ti)

579-Q. Mechanical Properties of Resistance Heated, Hot-Stretch-Formed Titanium Alloy Sheet. H. C. Turner. *Convair, Report No.* 9877, Oct. 1955, 6 p.

Effect of hot stretch forming on the tensile and compression properties of titanium alloy sheet. Tables. (Q27, Q28, G9, Ti)

580-Q. Ductile Chromium. W. H. Smith and A. U. Seybolt. *Electrochemical Society, Journal,* v. 103, June 1956, p. 347-352.

Effects of certain impurities on the room temperature ductility of chromium. Graphs, micrograph. 10 ref. (Q23, Cr)

581-Q. The Criterion for the Cleavage Fracture of Zinc Single Crystals. A. Deruyttere and G. B. Greenough. *Institute of Metals, Journal,* v. 84, May 1956, p. 337-345 + 1 plate.

Stresses and deformation at fracture determined for long crystals of zinc. Observations on stress-strain curves included. Diagram, graphs, tables, photograph. 21 ref. (Q26, Q27, Zn)

582-Q. A Theory of the Yield Point and the Transition Temperature of Mild Steel. F. Forscher. *Journal of Applied Mechanics,* v. 23, June 1956, p. 219-224.

Theoretical derivation and correlation of the strain-rate effect, temperature effect, the yield-delay phenomenon, the tri-axiality and their interaction on the yield point. Graphs. 35 ref. (Q23, ST)

583-Q. Comparison of Slip-Line Solutions With Experiment. E. G. Thomsen. *Journal of Applied Mechanics,* v. 23, June 1956, p. 225-230.

Plane-strain and axially symmetric approximate solutions for a perfect plastic compared with experimental results obtained from the extrusion of a billet of commercially pure aluminum. Graphs, diagram. 13 ref. (Q24, F24, Al)

584-Q. Theory of Mechanical Damping Due to Dislocations. A. Granato and K. Lücke. *Journal of Applied Physics,* v. 27, June 1956, p. 583-593.

Theory provides a quantitative interpretation of stain-amplitude dependent hysteresis loss. Table, graphs, diagrams. 17 ref. (Q8, M26)

585-Q. Hardness Plateaus and Twinning in Steel by Explosives With Lined Cavities. Sampooran Singh, N. R. Krishnaswamy and A. Soundraraj. *Journal of Applied Physics,* v. 27, June 1956, p. 617-620.

Changes in hardness and microstructure in annealed low-carbon steel caused by jets squirted from high explosives with steel-lined conical cavities. Micrographs, graph, table. 14 ref. (Q29, Q24, M27, CN)

586-Q. Effect of Nuclear Radiation on Structural Materials. J. C. Wilson and D. S. Billington. *Journal of Metals,* v. 8, May 1956, p. 665-672.

Choice of construction materials for high flux regions of reactors is complicated by difficult and costly experimentation required to determine radiation effects and interrelationship of structural properties in irradiated metals. Tables, graphs. 28 ref. (Q general)

587-Q. Effects of Alloying Elements on Plastic Deformation in Aluminum Single Crystals. E. E. Underwood and L. L. Marsh, Jr. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, May 1956, p. 477-483.

Aluminum single crystals, alloyed with 0.042 at. % copper and 0.11 at.% magnesium were subjected to constant-stress creep tests, tensile tests and hot hardness measurements within a temperature range of 300 to 866° K. Graphs. 27 ref. (Q24, Al)

588-Q. Tensile Characteristics of Particle-Strengthened Alloys of Zirconium With Iron. J. H. Keeler. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, May 1956, p. 486-491.

The absolute increase in strength due to particle strengthening, although decreasing with increasing temperature, was a greater percentage at high temperature. Micrographs, graphs, tables. 19 ref. (Q27, Fe, Zr)

589-Q. Some Transient Effects During Creep and Tensile Tests of an Aluminum Alloy. H. A. Lequear and J. D. Lubahn. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, May 1956, p. 497-501.

A specially devised test shows that the nature of the previous steady-state conditions, which a sudden change in strain rate disturbs, is one of the factors affecting transient behavior. Tables, graphs, diagrams. 9 ref. (Q3, Q27, Al)

590-Q. Hydrogen Embrittlement of a Commercial Alpha-Beta Titanium Alloy. E. J. Ripling. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, May 1956, p. 502-503.

Embrittlement was attenuated if the hydrogen content was high, or eliminated when the hydrogen content was only moderate, by stretching at a high strain rate. Diagrams. 8 ref. (Q23, Q24, Ti)

591-Q. Heat Treatment and Mechanical Properties of Ti-Fe Alloys. F. C. Holden, H. R. Ogden and R. I. Jaffee. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, May 1956, p. 521-528.

The properties of quenched alloys were correlated with their microstructures. A comparison of specimens having equiaxed α-β structures with those having acicular α-β structures shows that equiaxed specimens have better tensile ductility, but lower impact resistance. Both strength and ductility are lowered by heat treatments below 700° C. Table, micrograph, graphs. 5 ref. (Q23, J26, J29, Fe, Ti)

592-Q. Strain-Induced Porosity and Hydrogen Embrittlement in Zirconium. F. Forscher. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, May 1956, p. 536-543.

Results suggest that strain-induced porosity results with hydride initially present, or, in material containing less than 50 ppm. hydrogen with hydride precipitated by strain aging. Diagrams, tables, micrographs, photograph, graphs. 12 ref. (Q23, N7, Zr)

593-Q. Mechanism of Intercrystalline Fracture. H. C. Chang and Nicholas J. Grant. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, May, 1956, p. 544-551.

On the basis of microscopic observations during creep tests and a knowledge of the interaction between grains and grain boundaries, a mechanism of intercrystalline fracture and propagation of the fracture is proposed. Micrographs, diagrams. 18 ref. (Q26, Q3)

594-Q. Sulfur Embrittlement of Cobalt. D. L. Martin. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, May 1956, p. 578-579.

Alloys evaluated for hot brittleness by heating to 1000° C. in a hydrogen furnace and swaging in air. Graph, table, micrographs, photograph. 13 ref. (Q23, Co)

595-Q. Fracture of Magnesium Alloys at Low Temperature. Frank E. Hauser, Philip R. Landon and John E. Dorn. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, May 1956, p. 589-593.

The flow and fracture strengths of polycrystalline aggregates of high-purity magnesium and a solid solution of aluminum in magnesium determined as functions of temperature and grain size. Graphs, tables, diagram. 10 ref. (Q26, Mg)

596-Q. Influence of Order-Disorder on Creep of Beta Brass. M. Herman and N. Brown. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, May 1956, p. 604-606.

The creep strength increased as the amount of long range order increased. Graphs. 9 ref. (Q3, N10, Cu)

597-Q. Friction in a Close-Contact System. Walter Claypoole. *Mechanical Engineering,* v. 78, June 1956, p. 529-532.

Fundamental aspects of problem and experimental evidence supporting new inferences with regard to friction. Diagram, graphs, photograph, micrograph. (Q9)

598-Q. Design of High-Temperature Alloys—Cermets and Oxide Dispersions. Nicholas J. Grant. *Metal Progress,* v. 69. June 1956, p. 76-80.

The best alloys now known are based on cobalt and nickel, the first age hardened by carbide dispersion and the second by $Ni_3(Al, Ti)$ compound. Pure metals, refractory and ductile, may be strengthened by oxide dispersions or used as binders for hard, brittle particles. Micrographs, graphs, tables. (Q general, SG-h, C-n, Co, Ni)

599-Q. Effect of Temperature on Strength-Weight Ratio of Aircraft Materials. *Metal Progress,* v. 69, June 1956, p. 80-B.

Curves for various titanium, stainless steel, magnesium, molybdenum and Inconel alloys. Graph. (Q23, Ni, Ti, SS, Mg, Mo)

600-Q. High-Temperature Alloys for Jet-Engine Buckets. (Digest of "Wrought Jet Engine Bucket Alloys", by Stephen G. Demirjian, presented at Detroit Technical Meeting of Society of Automotive Engineers, January 1956.) *Metal Progress* v. 69, June 1956, p. 198, 200, 202.

Cobalt and nickel-base alloys are being studied for possible improvements in properties. Forging procedures discussed. (Q general, F22, Co, Ni)

601-Q. Dislocation Theories of Strength and Plasticity. A. V. Stepanov. *Research,* v. 9, June 1956, p. 227-236. (Translated from *Bulletin of the Academy of Sciences of the U. S. S. R.,* v. 18, Sept. 1954, p. 90.)

The fundamental principles underlying existing dislocation theories discussed and criticized; an alternative approach to the study of strength and plasticity of crystals proposed. Diagrams. 13 ref. (Q23, Q24, M26)

602-Q. Fatigue Failures. Charles M. Schwartz. *SAE Journal,* v. 64, June 1956, p. 49.

Fatigue failures appear to be related to "mistakes" in the crystal structure of a ductile metal. The relationship between fatigue failures and imperfections in the crystal might be deduced from correlation of X-ray measurements of atoms dislocated by microstresses from their ideal position in the crystal lattice with fatigue data. (Q7, M26)

603-Q. Properties of Some Tungsten and Titanium Steels Containing Boron. A. Bannerjee, D. K. Sood and P. Mehta. *TISCO,* v. 3, Apr. 1956, p. 53-62.

Effect of boron on the properties of low-carbon, low-alloy steels. Similarity in the effects of molybdenum, tungsten and titanium in boron-treated steels. Precipitation hardening in molybdenum-boron steels and their weldability. Micrographs, diagrams, graphs, tables. 25 ref. (Q general, J27, K9, AY)

604-Q. (English.) **An Experimental Investigation on the Mode of Slip in α-Brass.** H. Wilsdorf and J. T. Fourie. *Acta Metallurgica,* v. 4, no. 3, May 1956, p. 271-288.

It is concluded that slip is inhomogeneous. Tables, graphs, micrographs, diagrams. 9 ref. (Q24, Cu)

605-Q. (English.) **Internal Friction in Solid Solutions of Tantalum.** R. W. Powers and Margaret V. Doyle. *Acta Metallurgica,* v. 4, no. 3, May 1956, p. 233-242.

Experimental evidence that concentration broadening in oxygen-tantalum solutions is brought about by an interaction between interstitial oxygen atoms. Graphs, tables. 5 ref. (Q22, Ta)

606-Q. (English.) **On the Role of Grain Boundaries in Creep.** M. R. Achter and R. Smoluchowskii. *Acta Metallurgica,* v. 4, no. 3, May 1956, p. 331-332.

Rate of creep is influenced by the availablity of dislocations and the ease with which they can move across the grain boundary. Graph, diagram. 2 ref. (Q3, M26)

607-Q. (German.) **Contributions to a Theory of Plastic Strain of Wires.** Horst Lippmann. *Acta Metallurgica,* v. 4, no. 3, May 1956, p. 298-305.

Equations for spontaneous elongation and creep behavior. Taylor's theory of work-hardening. Graphs. 12 ref. (Q24, Q3)

608-Q. (German.) **The Behavior of a Welded Aluminum Alloy of the AlZn-Mgl Type.** A. Müller-Busse. *Aluminium,* v. 36, no. 6, June 1956, p. 333-339.

Data on static and fatigue strengths show that considerable use of the alloy for welded structures in the future can be predicted. Photographs, micrographs, graphs, tables. (Q23, Q7, K9, Zn, Mg, Al)

609-Q. (German.) **Behavior of Impact-Loaded Light Metal Welds Under a Consideration of Low Temperatures and Different Impact Rates.** M. Puschner. *Aluminium,* v. 36, no. 6, June 1956, p. 340-343.

Dependance of impact value on temperature and rate of impact. Graphs, tables, photographs, oscillograms. (Q6, Mg, Al)

610-Q. (German.) **Dislocation Damping of Aluminum Single Crystals at Room Temperature.** Wolfgang Kempe and Ekkehart Kröner. *Zeitschrift für Metallkunde,* v. 47, no. 5, May 1956, p. 302-304.

Measurements indicate that attenuation of pure aluminum at room temperature in the kc. zone is chiefly due to dislocations. Graphs, diagram. 7 ref. (Q8, M26, Al)

611-Q. (German.) **Effect of Load on X-Ray Determined Bending Yield Stress.** Eckard Macherauch. *Zeitschrift für Metallkunde,* v. 47, no. 5, May 1956, p. 312-330.

Steels of different consistency and duralumin were subjected to bending with, and without, impact repetitive stress. Elongation was measured mechanically and by X-ray. Tables, graphs, diagrams, photograph. 61 ref. (Q5, Al, ST)

612-Q. (German.) **Tensile Deformation of Copper Single Crystals. I. Plastic Stress-Strain Curves and Surface Phenomena.** Jörg Diehl. *Zeitschrift für Metallkunde,* v. 47, no. 5, May 1956, p. 331-343.

The consolidation curve is divided into three zones which follow different laws and which differ in their dependence on crystal orientation. Micrographs, tables, graphs, diagrams. 53 ref. (Q27, Q24, Cu)

613-Q. Studies of Factors Affecting Thermal Stability of Titanium-Base Alloys. *Battelle Memorial Institute, Second Progress Report for Wright Air Development Center Contract No.* AF 33(616)-3208, Apr. 1956, 6 p.

Initial tensile tests on Ti-6Al-4V and Ti-155-A show lowest strengths obtained were on samples fabricated and annealed in the beta field and highest strengths were obtained on samples fabricated in the beta field and annealed in the alpha-beta field. (Q27 Ti)

614-Q. Heat Treatment of 6Al-4V Titanium Alloy (1675° F. Solution Heat Treatment.) S. Guintoli and H. C. Turner. *Convair, Report No.* 56-85, Apr. 1956, 5 p.

Determines effect of solution heat treating at 1675° F. for 1 hr., water quenching, and aging at 900° F. on mechanical properties, and the reproducibility of mechanical properties obtained with the heat treatment when applied to various heats of the alloy. (Q25, J27, J26, Ti)

615-Q. Correlation of Hydrogen Content to Tensile and Fatigue Properties in Heliarc-Welded A-110AT Titanium Alloy Sheet. *Convair, Report No.* 56-189, Apr. 1956, 7 p.

No exact correlation could be found. (Q27, K1, Q7, Ti)

616-Q. Creep and Stress-Rupture Properties of Zirconium, Effect of Annealing Treatment. R. W. Guard and J. H. Keeler. *General Electric Research Laboratory, Report No.* 56-RL-1541, May 1956, 17 p.

Significant creep does not occur at stresses below the yield strength at temperatures below 300° C. The effect of annealing treatments is significant only at 500° C. Twinning is prominent at 300° C. and below, while polygonization and boundary deformation are important at 500° C. (Q3, Q4, J23 Zr)

617-Q. Experiences in the Heating of Steel. W. Trinks. *Industrial Heating,* v. 23, June 1956, p. 1221-1222, 1224, 1226.

Comments on the rate at which steels of various compositions and sizes can be heated without the formation of cracks. (Q26, J general, ST)

618-Q. Stress at Low Temperatures. H. G. Baron. *Iron and Steel Institute, Journal,* v. 29, June 1956, p. 243-249.

Curves for some metals and alloys at high rates of strain. (Q25, Al, Cu, ST)

619-Q. Yield at Low Temperatures. H. F. Hall and R. W. Nichols. *Iron and Steel Institute, Journal,* v. 29, June 1956, p. 249-252.

Properties of some carbon and low-alloy steels. (Q23, Q25, Cu, Al, ST)

620-Q. Hardness at Low Temperatures. R. W. Nichols. *Iron and Steel Institute, Journal,* v. 29, June 1956, p. 253-256.

Tests with pyramid and ball indentors. (Q29, ST)

621-Q. Carbon Steel Wire. R. W. Nichols. *Iron and Steel Institute, Journal,* v. 29, June 1956, p. 256-262.

Effects of low temperature on the tensile, fatigue and reverse-bend strength of steel wire, and the influence of electro-galvanizing on these properties. (Q general, L17, Zn, CN)

622-Q. Manganese-Molybdenum Steels. N. P. Allen and C. C. Earley. *Iron and Steel Institute, Journal,* v. 29, June 1956, p. 262-267.

Effect of phosphorus on impact value. (Q6, AY)

623-Q. Boron-Treated Steel. Samuel J. Rosenberg and John D. Grimsley. *Iron and Steel Institute, Journal,* v. 29, June 1956, p. 267-274.

A study of the impact properties. (Q6, AY-h)

624-Q. Intergranular Fracture in Steel Castings. *Journal of Steel Castings Research,* no. 5, May 1956, p. 10-14.

Nitrogen and aluminum in steel; fractography of commercial steels; effect of heat treatment. (To be continued.) (Q26, M23, J general)

625-Q. Relative Load Change of Compression and Extension Springs Due to Certain Dimensional Variations. *Mainspring,* v. 16, no. 7, June 1956, 4 p.

Mathematical relationships are graphed to show the relative load change due to the magnitude of major variables: wire diameter, coil diameter, number of active coils and deflection from free length. (Q21)

626-Q. The Lowering of Fracture-Stress Due to Surface Adsorption. N. J. Petch. *Philosophical Magazine,* v. 1, 8th ser., no. 4, Apr. 1956, p. 331-337.

Gibbs' adsorption equation and the Griffith and dislocation theories of fracture are used to calculate this lowering. (Q26, P13)

627-Q. Magnetic Anisotropy and Cold Worked Texture of Titanium. J. Reekie and Y. L. Yao. *Physical Society, Proceedings,* v. 69, no. 436B, Apr. 1956, p. 417-431.

Knowing magnetic anisotropy, it is possible to estimate texture in a specimen of cold worked or annealed metal from susceptibility measurements made in three orthogonal directions. (Q24, P16, Ti)

628-Q. High-Temperature Vacuum Furnace for Tensile Testing. E. A. Smith and R. W. Guard. *Review of Scientific Instruments,* v. 27, June 1956, p. 386-387.

A resistance furnace using a tantalum tube heater was constructed for testing wire specimens of metals that require protection from the atmosphere at temperatures up to 1600° C. (Q27)

629-Q. Hardness Testing. I. Vincent E. Lysaght. *Steel,* v. 138, June 25, 1956, p. 98-100, 102.

Vickers, Rockwell and Brinell hardness testers compared. (Q29)

630-Q. Hardness Testing. II. Microhardness Methods. Vincent E. Lysaght. *Steel,* v. 139, July 2, 1956, p. 72-73.

Microhardness tests are best for electroplatings and hard, thin surface coatings, also good for determining limits of decarburization. (Q29)

631-Q. Surfaces Can Be Too Smooth. C. R. Lewis and A. L. Thomson. *Tool Engineer,* v. 37, July 1956, p. 113-116.

Effects of finish on wear and frictional properties. Finish quality beyond the point of utility is uneconomical. (Q9, G19)

632-Q. Effect of Rapid Heating and Cooling on the Hardness and Strength of 2014-T6 and 7075-T6 Aluminum Alloys. W. K. Smith. *U. S. Naval Ordnance Test Station, Navord Report* 5065, Apr. 1956, 12 p.

The alloys, used in rocket motor tubes, were heated at 165° F. per sec. and air cooled. Hardness was measured immediately and 100 hr. after the heating and cooling cycle. Maximum temperatures of local areas of the fired motor tubes can be estimated from hardness values. Graphs. 2 ref. (Q29, Q23, Al)

633-Q. Evaluation of the Significance of Charpy Tests for Quenched and Tempered Steels. P. P. Puzak and W. S. Pellini. *Welding Journal,* v. 35, June 1956, p. 275s-290s.

High-strength steels tested to determine critical fracture transition temperatures at which welded structures, loaded in the presence of sharp, crack-like defects, may initiate or propagate brittle fractures. (Q23, ST)

634-Q. Some Dynamic Mechanical Properties of Heat Treated Low-Alloy Weld Deposits. E. H. Franks and W. H. Wooding. *Welding Journal,* v. 35, June 1956, p. 291s-297s, 307s.

Nickel-molybdenum-vanadium deposits are of good quality, have excellent ductility and show exceptional endurance limits under cycles of reversed stress. (Q23, K1, AY)

635-Q. Fatigue Strength of Welds in Low-Alloy Structural Steels. J. E. Stallmeyer, G. E. Nordmark, W. H. Munse and N. M. Newmark. *Welding Journal,* v. 35, June 1956, p. 298s-307s.

For all types of specimens tested, there is little difference in the fatigue strengths. (Q7, K1, AY)

636-Q. Proper Fabrication Tames Titanium Embrittlement. Andrew N. Eshman. *Western Metals,* v. 6, June 1956, p. 69-71.

Methods for controlling the three types of embrittlement. (Q23, Ti)

637-Q. Intermittent Stressing and Heating of Aircraft Structural Metals. J. F. Hanlon and G. J. Guarnieri. *Cornell Aeronautical Laboratory, Inc.,* Reports for Apr. 30, 1954 and Dec. 31, 1954. Contract No. AF33(161)-2226. 19 p. and 20 p.

Determination of creep-rupture characteristics of RC-130-A under conditions of constant temperature-constant load, and creep rupture behavior of RC-70 under intermittent heating and loading conditions. (Q3, Ti)

638-Q. Tensile Properties of Aircraft-Structural Metals at Various Rates of Loading After Rapid Heating. *South-*

ern Research Institute, Fourteenth Progress Report to Wright Air Development Center, Contract No. AF 33(616)-424, Jan. 1956, 29 p.

Tabular presentation of tensile properties of stainless steels and heat-resisting alloys under various conditions of temperature, strain rate and holding time. (Q23, Ti, SS, SG-h)

639-Q. (English.) **Formation of Blisters in Iron.** F. De Kazinczy. *Jernkontorets Annaler,* v. 140, no. 5, 1956, p. 347-359.

Hydrogen pressure required for formation of cracks was determined in iron with low carbon and oxygen contents. (Q23, Q26, N1, Fe)

640-Q. (German.) **Hardness and Wear Resistance of Electrolytic Silver Coatings.** R. Weiner and E. Brosch. *Metalloberflache,* v. 10, no. 6, June 1956, p. 164-167.

Shows no direct relation between indentation hardness and wear resistance. Mechanical properties of various electrolytic silver coatings are similar. (Q29, Q9, L17, Ag)

641-Q. (German.) **On the Hot-Brittleness of Copper.** W. Engelhardt and F. Neuberger. *Neue Hütte,* v. 1, no. 6, May 1956, p. 339-343.

Tensile strength, breaking elongation and reduction of the fracture area of copper. Uniform elongation and local elongation. Test of a copper deoxidized with phosphorus. (Q23, Q27, Q26, Cu)

642-Q. (Italian.) **Internal Friction: A New Physical Quantity for the Study of Metals.** T. Federighi. *Alluminio,* v. 25, no. 5, May 1956, p. 225-230.

Essential characteristics of internal friction are illustrated, with explanation of the physical significance as well as methods of measurement. (Q22)

643-Q. (Russian.) **Influence of Oxidation Films on the Adsorption Effect Facilitating Plastic Deformation of Polycrystalline Aluminum.** Iu. V. Goriunov and B. Ia. Iampol'skii. *Doklady Akademii Nauk SSSR,* v. 107, no. 6, June 1956, p. 827-829.

Experiments showing that natural oxidation films on the surface of metals reduce the absorptive effect of media employed to lower the surface tension of the metal and to facilitate its deformation. (Q24, Al)

644-Q. (Russian.) **Mechanism of the Effect of Small Amounts of Phosphorus and Molybdenum on the Temper Brittleness of Steel.** V. I. Arkharov, S. I. Ivanovskaia, N. M. Kolesnikova and T. A. Fofanova. *Fizika Metallov i Metallovedenie,* v. 2, no. 1, 1956, p. 57-65 plus 1 plate.

Types of cracks, impact toughness, chemical analyses. Metallurgical investigation of diffusion front during diffusion of phosphorus in chromium-nickel and chromium-nickel-molybdenum steels. (Q23, Q6, N1, AY)

645-Q. (Russian.) **Effect of "Rest" on the Strength of Quench-Hardened Steel and Its Tendency to Delayed Fracture.** S. S. Shurakov. *Fizika Metallov i Metallovedenie,* v. 2, no. 1, 1956, p. 66-77 plus 1 plate.

The "rest" is the period of time elapsing between quenching and beginning of testing. Increasing rest time increases strength and plasticity in the case of the usual static-load tests and decreases tendency to delayed fracture. (Q23, Q26, J26, CN)

646-Q. (Russian.) **Strength of Quenched Steel.** A. Nemchinskii and N. Fokina. *Fizika Metallov i Metallovedenie,* v. 2, no. 1, 1956, p. 78-87.

Effect of rate of cooling during quenching, time until start of testing, and length of time of load on strength. Rate of surface cooling in relation to coefficient of heat transfer. (Q23, J26, CN)

647-Q. (Russian.) **Basic Formulas for Calculations in the Range of Finite Elastoplastic Deformations.** G. P. Zaitsev. *Fizika Metallov i Metallovedenie,* v. 2, no. 1, 1956, p.120-124.

Formulas determining relation of differences of principal stresses to the differences of the corresponding principal elongations or angular deformations are a consequence of the application of the principle of superposition. (Q21, Q24, Q23, Q25, Q2)

648-Q. (Russian.) **Finite Elastoplastic Angular Deformations (Shears) in the Basis-Type, Logarithmic, and Other Systems of Magnitudes.** *Fizika Metallov i Metallovedenie,* v. 2, no. 1, 1956, p. 125-136.

The system of variable magnitudes is called a "basis-type" if the absolute increases of these magnitudes are compared with their original values. Problem of so-called true elongations or shears. (Q21, Q24, Q2)

649-Q. (Russian.) **Character of Yield Point With Tension.** Ia. B. Gurevich. *Fizika Metallov i Metallovedenie,* v. 2, no. 1, 1956, p.137-141.

Elastic limit and discontinuous yield point. Size of plateaus for discontinuous yield point, mechanical properties of steels melted under vac-

uum and in air. Effect of nonmetallic inclusions, including gases. (Q23, ST)

650-Q. (Russian.) **Effect of Rate and Degree of Plastic Strain on Relaxation and Subsequent Deformability of Metals. I-II.** L. I. Vasil'ev, L. M. Butkevich, E. I. Orekhov and L. A. Spevak. *Fizika Metallov i Metallovedenie,* v. 2, no. 1, 1956, p. 142-148.

Relaxation and tension curves, deformation at low and high temperatures, load conditions and time factor in relation to formation and release of deformations. (Q27, Q3, Q23, Sn, Cu, Al, Pb)

651-Q. (Russian.) **Experimental Determination of the Properties of Incomplete Elasticity of Spring Materials.** S. O. Tsobkallo. *Fizika Metallov i Metallovedenie,* v. 2, no. 1, 1956, p. 149-159.

Present-day methods of measuring elastic fatigue and elastic limit. Relation of deformation to time in testing for elastic fatigue. Role of intermediate loads. (Q21, SG-b)

652-Q. (Russian.) **Effect of Plastic Deformation on the Modulus of Elasticity of Low-Carbon Steel.** V. I. Korotkov. *Fizika Metallov i Metallovedenie,* v. 2, no. 1, 1956, p. 160-167.

Effect of cold plastic deformation and of heat treatment on Young's modulus and shear modulus of plastically deformed steel. (Q21, Q2, J general, CN)

653-Q. (Russian.) **Nonhomogeneity of Deformation in Plastic Compression. I.** G. I. Karpov. *Fizika Metallov i Metallovedenie,* v. 2, no. 1, 1956, p. 168-171.

During the plastic compression of cylindrical specimens, there is a great deal of nonhomogeneity both in the deformation and cold hardening of various parts of the specimen. Method of secondary compression is used. (Q28, Q24, Cu)

654-Q. (Russian.) **Distribution of Deformations During Compression of Cylinders at a High Rate. II.** G. I. Karpov. *Fizika Metallov i Metallovedenie,* v. 2, no. 1, 1956, p. 172-175.

Compression is carried out at a rate of 100 meters per sec. Patterns of distribution are attributable to forces of inertia and unevenness of rate of deformation throughout the specimen. (Q28, Q24, Cu)

655-Q. (Russian.) **Problem of Relation Between Hardness and Composition of Dilute Solid Solutions.** V. P. Shishokin and V. A. Ageeva. *Fizika Metallov i Metallovedenie,* v. 2, no. 1, 1956, p. 176-180.

Study of hardness at different temperatures and rates of deformation. Hardness is determined by two factors: relation of volumes of particles and the mutual polarization action of particles. (Q29, N12, Bi, Pb, Sn, Hg, Cd)

656-Q. (Russian.) **Erosion Wear of Metals and Protection by Coatings.** A. V. Shreider. *Fizika Metallov i Metallovedenie,* v. 2, no. 1, 1956, p. 181-188.

Criteria and characterization of resistance of materials to erosion-abrasive wear, including factors of hardness of metal, surface condition, speed of flight and angle of fall of particles. (Q9, L19, Al, Cu, Mg, Fe)

657-Q. (Russian.) **Creep of Aluminum Under a Dynamic Load.** A. A. Predvoditelev and B. A. Smirnov. *Moskovskogo, Universiteta, Vestnik, Seriia Fiziko-Matematicheskikh i Esterstvennykh Nauk,* v. 2, no. 3, Mar. 1956, p. 51-55.

Creep tests of aluminum under pulsating dynamic loads show sharp increase in creep, similarity between dynamic and static creep curves, and conformity of experimental with theoretical data which permits explaining results by an intensification of slide processes in metallic grains under a dynamic load. (Q3, Al)

658-Q. (Swedish.) **Influence of Boron on Tensile Strength and Structure of Black-Heart Malleable Iron.** Gustaf Ostberg. *Gjuteriet,* v. 46, no. 5, May 1956, p. 72-76.

The tendency of boron to lower tensile strength, yield point and elongation is attributed to the shape of the graphite flakes and their distribution in the microstructure. (Q27, Q23, M27, N8, CI)

659-Q. (Swedish.) **Importance of the Surface Effect on the Initiation of Fatigue Cracks.** *Jernkontorets Annaler,* v. 140, no. 5, 1956, p. 360-372.

Fatigue experiments on three carbon steels and one chromium-nickel steel indicate a surface effect which appears to contribute to the initiation of fatigue cracks. (Q7, ST)

660-Q. Some Aspects of the Problem of Fatigue. F. J. Hiorns. *British Coal Utilization Research Association, Monthly Bulletin,* v. 20, Apr. 1956, p. 153-160.

Factors influencing the fatigue strength of materials; propagation of fatigue cracks; nature of the fatigue process; fatigue in brittle materials. (Q7)

661-Q. Photoelastic Analysis of Stresses in the Detachable Rock Bit.

Shoji Shimamura and Morio Jido. *Journal of Mechanical Laboratory (Japan)*, v. 1, 1955, p. 15-16.

Photoelastic fringe patterns show stress distribution. (Q25, AY)

662-Q. Fundamental Study on Manufacturing Standard Block for Hardness Measurement. III. The Effect of Subzero-Treatment Conditions on the Hardness Distribution. Tetsutaro Mitsuhashi, Manabu Ueno and Shin Yokoi. *Journal of Mechanical Laboratory (Japan)*, v. 1, 1955, p. 16-18.

Hardness was increased by subzero-treatment, but the relation between subzero-treatment method and the increment of hardness was not clear. (Q29, J26)

663-Q. Effect of Carbon on Some Properties of Ti-Mo Alloys. D. W. Levinson, W. Rostoker and A. Yamamoto. *Journal of Metals, v. 8; American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, June 1956, p. 790-793.

Influence of carbon on tensile strength tensile ductility, transformation kinetics and grain growth characteristics. (Q23, N3, N6, Ti, Mo)

664-Q. The Measurement of Frictional Forces at Vibrating Contacts. J. S. Halliday. *Journal of Scientific Instruments*, v. 33, June 1956, p. 213-217.

A simple machine used for the investigation of wear phenomena. (Q9)

665-Q. Investigating the Strength of Copper-Brazed Joints. R. C. Grassi, I. Cornet and R. S. Berger. *Mechanical Engineering*, v. 78, July 1956, p. 630-632.

The high strength of a copper-brazed joint may be attributed to a greater work hardening capacity of the thin braze metal under restraint, in conjunction with an increase in the strength of the copper-braze metal due to alloying with iron. (Q2, K8, Cu, CN)

666-Q. An Oblique Illuminator for Use in Hardness Testing. S. A. Dunk. *Metallurgia*, v. 53, no. 320, June 1956, p. 289-291.

Construction and applications. (Q29)

667-Q. Slow-Cooling Cracks a Carburizing Problem. T. W. Ruffle and P. C. Kirby. *Metal Treatment and Drop Forging*, v. 23, June 1956, p. 237-242.

Maximum carbon content in the case should be kept as low as practicable. More rapid cooling from carburizing either by direct air cooling or oil quenching will almost certainly eliminate cracking. (Q26, J28, ST)

668-Q. Elastic Moduli of Indium Antimonide. Roy F. Potter. *Physical Review*, v. 103, ser. 2, July 1, 1956, p. 47-50.

Elastic constants for the semiconductor indium antimonide measured as a function of temperature, using the composite resonator technique. (Q21, Sb, In)

669-Q. Investigation of the Effect of Impact Damage on Fatigue Strength of Jet-Engine Compressor Rotor Blades. Albert Kaufman and André J. Meyer, Jr. *U. S. National Advisory Committee for Aeronautics, Technical Note* 3275, June 1956, 25 p.

The most serious damage was nicks at blade edges. The farther the damage was from the maximum-vibratory-stress section of the airfoil and from the edges, the less detrimental it was. (Q7, Q6)

670-Q. (Czech.) **Steel for Ball Bearings.** Vladimir Dusek. *Hutnik*, v. 6, no. 1, Jan. 1956, p. 9-11.

Requirements for steels, effect of nonmetallic inclusions, including oxygen and hydrogen, on strength and impact toughness, comparison of ball-bearing steels from the basic electric furnace and the openhearth basic or acid furnaces. (Q23, Q29, T7, Q6, ST)

671-Q. (Japanese.) **Study on the Toughness Improvement by Addition of Small Amounts of Ferro-Titanium in Structural Steel. I.** Toshio Saito. *Iron & Steel Institute of Japan, Journal*, v. 42, no. 6, June 1956, p. 490-495.

Examination of ingots showed that titanium was more effective than molybdenum or vanadium in alloy steel, decreased brittleness in manganese steels, produced fine austenite grains in any steel, was not recommended for plain carbon steels, but was extremely effective for Ni-Cr-Mo structural steels. (Q23, D general, ST)

672-Q. (Japanese.) **Mechanical Properties of S816 at Elevated Temperature. I.** Taro Hasegawa, Osamu Ochiai and Junichi Ino. *Iron & Steel Institute of Japan, Journal*, v. 42, no. 6, June 1956, p. 498-502.

Effect of solution-treatment temperature and aging on the creep rupture characteristics at 732° C and 26.6 kg. per sq. m.m. (Q3, AY)

673-Q. (German.) **Effect of the Sulfur in the Furnace Atmosphere on Behavior in the Deformation of Plain**

Carbon Steels. Kurt Born. *Stahl und Eisen,* v. 76, no. 13, June 28, 1956, p. 789-799.

Hot bending tests after annealing in sulphur-free and sulphur-containing furnace gases. Effects of copper and tin contents. (Q24, J23, Q5, CN)

674-Q. (Russian.) **Heat Resistance and Relaxation Resistance of Chromium-Vanadium and Chromium-Tungsten-Vanadium Structural Steels.** L. Ia. Liberman and A. V. Boeva. *Metallovedenie i Obrabotka Metallov,* 1956, no. 4, Apr. 1956, p. 2-10.

Impact toughness after high and cyclic tempering with rapid and slow cooling. Effect of lengthy soaking and heat treatment variations on mechanical properties. Effect of content of alloying elements and carbon on creep resistance and long-time strength. (Q3, Q23, J29, AY-n)

675-Q. (Russian.) **Variation in the Fatigue Limits of Aluminum Alloys Under the Influence of Anodic Oxidation.** A. V. Shreider, A. V. Bialobzheskii, Z. T. Zagritsenko and B. V. Serebrennikov. *Metallovedenie i Obrabotka Metallov,* 1956, no. 4, Apr. 1956, p. 14-20.

Chromic acid anodizing increases endurance and strength. Investigation on the effect of sulphuric acid anodizing on fatigue limits, and effect of oxide coating thickness and polishing. (Q7, L19, Al)

676-Q. (Russian.) **Investigation of Irreversible Temper Brittleness of Alloyed Ferrite.** M. M. Shteinberg, V. D. Sadovskii and A. V. Demakova. *Metallovedenie i Obrabotka Metallov,* 1956, no. 4, Apr. 1956, p. 21-25.

Relation of impact toughness and hardness to tempering temperatures in alloy steels. Theories consider role of retained austenite, formation of carbides, and evolution of chromium and manganese nitrides during tempering. (Q23, J29, N8, AY)

677-Q. (Russian.) **Mechanical Properties of Sheets From Continuous Castings.** N. L. Komandin, I. E. Kurov and I. I. Vedeniapina. *Metallovedenie i Obrabotka Metallov,* 1956, no. 5, May 1956, p. 12-15.

In sheets rolled from continuous castings, mechanical properties are distributed more evenly, and plasticity and ductility are somewhat higher than in sheets from ordinary ingots. (Q general, D9)

678-Q. (Russian.) **The Ductility-Semibrittleness Transition Point in Structural Steel.** I. E. Kontorovich and B. M. Voshedchenko. *Metallovedenie i Obrabotka Metallov,* 1956, no. 5, May 1956, p. 19-24.

Influence of various heat treatment procedures. (Q23, J general, ST)

679-Q. (Russian.) **Mechanical Nature of Temper Brittleness.** G. V. Uzhik and A. A. Zuikova. *Metallovedenie i Obrabotka Metallov,* 1956, no. 4, Apr. 1956, p. 26-34.

Observations of tough and brittle states and stages of development of cracking in notched specimens subject to bending and impact tests. Stage of initial plastic deformation. Varying capacity of materials to resist development of cracking already begun. (Q23, Q5, Q6, ST)

680-Q. (Russian.) **The Effect of Cold Treatment on the Properties of High-Alloy Steels.** M. A. Balter. *Metallovedenie i Obrabotka Metallov,* 1956, no. 5, May 1956, p. 33-40.

Effect of treatment, below freezing point, on certain properties of carburized high alloy steel, is compared with a procedure employing annealing at 650° C. between carburization and hardening. (Q general, J26, AY)

681-Q. (Russian.) **Sulfide Treatment of Chromium Stainless Steels.** E. P. Pukhovskii, P. A. Zakharova, N. A. Shpigunova and G. P. Budaev. *Metallovedenie i Obrabotka Metallov,* 1956, no. 5, May 1956, p. 40-43.

Sulphide treatment is found to reduce wear of stainless steel very substantially and also reduces wear of other steels to a considerable extent. (Q9, ST, SS)

682-Q. (Russian.) **Residual Stresses at the Junction of Two Hardened Layers.** G. F. Golovin. *Metallovedenie i Obrabotka Metallov,* 1956, no. 5, May 1956, p. 43-47.

A study of distribution of residual stresses over a surface depending on various hardening procedures. Suggests undesirability of surface treatment by separate hardening of adjacent layers. (Q25)

683-Q. (Russian.) **Variation of Yield Points and Strength in Relation to Amount of Reduction During Cold Rolling of Thin Stainless-Steel Ribbon.** A. V. Tret'iakov. *Metallovedenie i Obrabodka Metallov,* 1956, no. 4, Apr. 1956, p. 56-58.

Yield points and resistance time for three steels in tensometric tests. (Q23, SS)

684-Q. (Russian.) **A Method of Evaluating the Hydrogen Embrittlement in**

Steel. M. A. Figel'man and A. V. Shreider. *Zavodskaia Laboratoriia,* v. 22, no. 5, May 1956, p. 586-588.

A device for cyclic bend testing of hydrogen absorbing steels. (Q5, ST)

685-Q. Thermal-Cycling Test of a Hot Spot on a Vessel. P. N. Randall and H. A. Lang. *ASME, Transactions,* v. 78, July 1956, p. 1003-1009; disc., p. 1009-1010.

Tests on a catalytic-cracker regenerator shell revealed no evidence of cracking or of deterioration of the metallic structure. (Q7)

686-Q. Some Cases of Stress Due to Temperature Gradient. D. J. Bergman. *ASME, Transactions,* v. 78, July 1956, p. 1011-1017; disc., p. 1017-1019.

A qualitative analysis of the stress due to a maintained temperature differential in a flat bar is given for both free and restrained bar, and a comparison with the cases of a flat plate and a thick pipe. (Q25)

687-Q. Study of Die Wear by Means of Radioactivated Surfaces. B. J. Jaoul. *ASME, Transactions,* v. 78, July 1956, p. 1135-1139.

Radioactive techniques were successfully applied to the wear of a die face during hot extrusion of steels. (Q9, S19, F24, ST)

688-Q. The Mechanical Properties of Binary and Ternary Magnesium Alloys Containing Lithium. W. R. D. Jones. *Institute of Metals, Journal,* v. 84, June 1956, p. 364-387 + 1 plate.

Magnesium-lithium-base alloys compare favorably on a strength-weight basis with the strongest commercial aluminum-base alloys; they exhibit high ductility but poor work-hardening qualities and lack stable mechanical properties. (Q23, Mg, Li)

689-Q. New Apparatus For Friction Measurement. P. J. Willson, S. B. Twiss and D. M. Teague. *ISA Journal,* v. 3, July 1956, p. 224-228.

Apparatus consists essentially of a variable speed, heated metal disk against which a flat test specimen is pressed by dead weight loading. Unique instrumental features are the automatic linear increase of disk temperature, continuous recording of strain and semi-automatic control, and recording of other test variables. (Q9)

690-Q. External Strain-Gage Instrumentation at Transient Elevated Temperatures. Irving Sherlock and Robert C. Geiger. *ISA Journal,* v. 3, July 1956, p. 236-240.

Circuit requirements, calibration, temperature compensation, characteristics of etched foil strain gages for use during transient temperatures to 500° F. and installation procedure. (Q25)

691-Q. Effect of Neutron Irradiation Upon the Young's Modulus and Internal Friction of Copper Single Crystals. Donald O. Thompson and David K. Holmes. *Journal of Applied Physics,* v. 27, July 1956, p. 713-723.

Measurements of neutron irradiation effects upon single crystals of 99.999% purity at room temperature. (Q21, Q22, Cu)

692-Q. Strain-Amplitude Dependent Internal Friction Studies of Dilute Alloys of Copper. S. Weinig and E. S. Machlin. *Journal of Applied Physics,* v. 27, July 1956, p. 734-738.

Investigates the room-temperature decrement in dilute polycrystalline alloys of silicon and aluminum as a function of strain amplitude and annealing at a frequency of about 1 cycle per second. (Q23, J23, S, Cu)

693-Q. Application of Dislocation Theory to Internal Friction Phenomena at High Frequencies. A. Granato and K. Lücke. *Journal of Applied Physics,* v. 27, July 1956, p. 789-805.

Data concerning the damping of mechanical vibrations in the kilocycle and megacycle range. (Q22, M26)

694-Q. Creep of Aluminum Single Crystals. J. Weertman. *Journal of Applied Physics,* v. 27, July 1956, p. 832-834.

The stress range was studied from 157 to 616° C. (Q3, Al)

695-Q. How Metals Perform Under Repeated Impact. E. L. Layland. *Materials & Methods,* v. 44, July 1956, p. 104-105.

Comparative ratings are given for a number of wrought and cast materials, both ferrous and nonferrous. (Q6, Q7)

696-Q. Precision Measurements of Force. Arthur C. Ruge. *Metal Progress,* v. 70, July 1956, p. 92-93.

Strain gage dynamometers have been adopted by the National Bureau of Standards for calibration of loads and forces too large to be handled by proving rings. (Q general, S general)

697-Q. Photoelastic Investigation of Stresses in Conical Head Pressure Vessels. L. W. Smith and G. K. Cooper. *Society for Experimental Stress Analysis, Proceedings,* v. 13, no. 2, 1956, p. 7-20.

Analysis of stresses in the knuckle region of two conical head models machined from solid blocks of Fosterite. (Q25)

698-Q. The Interference Screen Method for Isopachic Patterns (Moiré Method). G. Mesmer. *Society for Experimental Stress Analysis, Proceedings,* v. 13, no. 2, 1956, p. 21-26.

New procedures use the system of fine lines of equal thickness in a model originally not being optically flat as a screen to build the isopachic lines by the moiré effect. (Q25)

699-Q. Simulated Service Testing. L. F. Kooistra. *Society for Experimental Stress Analysis, Proceedings,* v. 13, no. 2, 1956, p. 39-48.

Several methods employed in the power generation field, together with some data comparing test results with actual operation. (Q7, S21)

700-Q. Structural Testing of Aircraft Propellers. D. G. Richards. *Society for Experimental Stress Analysis, Proceedings,* v. 13, no. 2, 1956, p. 49-56.

Procedure involves vibration stress surveys conducted on the airplane in question, laboratory fatigue tests and service sampling. (Q7, S21)

701-Q. Methods of Waterproofing SR-4 Strain Gages. P. M. Palermo. *Society for Experimental Stress Analysis, Proceedings,* v. 13, no. 2, 1956, p. 79-83.

The barrier coat and rubber patches, Okonite-tape, and barrier coat and neoprene compound methods were tested for use on the outer hull of submarines. (Q25)

702-Q. Three Dimensional Photoelastic Analysis of Shafts in Pure Torsion and a Comparison With Results From Relaxation. R. C. Johnson. *Society for Experimental Stress Analysis, Proceedings,* v. 13, no. 2, 1956, p. 107-116; disc., p. 117-118.

The relaxation method is preferable for pure torsion analysis of shafts having symmetric solid cross-sections, whereas the photoelastic method is preferable for shafts having multiple-connected cross-sections or variable diameter. (Q25, Q1)

703-Q. Photoelastic Evaluation of Individual Principal Stresses by Large Field Absolute Retardation Measurements. D. Post. *Society for Experimental Stress Analysis, Proceedings,* v. 13, no. 2, 1956, p. 119-132.

Large-field interferometric techniques for absolute retardation measurements make possible simple and rapid evaluation of individual principal stresses throughout two-dimensional models. (Q25)

704-Q. The Mechanical Properties of Certain Steels as Indicated by Axial Dynamic Load Tests. R. C. Smith, T. E. Pardue and I. Vigness. *Society for Experimental Stress Analysis, Proceedings,* v. 13, no. 2, 1956, p. 183-197.

The influence of strain rate on the shape of the stress-strain curves for several steel materials was investigated. (Q27, ST)

705-Q. Properties of Arc-Welded Joints Between Aluminum and Stainless Steel. M. A. Miller and E. W. Mason. *Welding Journal,* v. 35, July 1956, p. 323s-328s.

Joint preparation and design and data on the performance of metallurgically bonded aluminum-steel joints. (Q21, Q7, K1, Al, SS)

706-Q. Investigation of Static and Fatigue Resistance of Model Pressure Vessels. Julien Dubuc and Georges Welter. *Welding Journal,* v. 35, July 1956, p. 329s-337s.

Results indicate remarkable performance for vessels subjected to extreme static cyclic loading. (Q23, Q7)

707-Q. Welded Top Plate Beam-Column Connections. R. Ford Pray and Cyril Jensen. *Welding Journal,* v. 35, July 1956, p. 338s-347s.

A method of analyzing a top plate and seated beam-column connection, accompanied by a test of a built-up two-way beam-column connection to verify it. (Q25, K1)

708-Q. (Czech.) Study of the Internal Cohesion of Deep Drawn Steel. Bohumil Otta. *Hutnik,* v. 6, no. 5, May 1956, p. 133-135.

Effect of the nonhomogeneity of the ingot and of other factors on the deep drawing qualities. Differences in hydrogen content may contribute to the varying degrees of cohesion. Some improvement in internal cohesion with aging. (Q23, G4, N7, CN)

709-Q. (Czech.) Fatigue Limits of Screws. F. Benes. *Strojirenstvi,* v. 6, no. 6, June 1956, p. 388-394.

Influence of material and its properties. Mechanical properties of bolts manufactured of various materials and heat treated for uniform strength. (Q7, T7)

710-Q. (Czech.) Improving the Resistance of Machine Parts to Abrasive Wear. K. Löbl, J. Nainar and R.

Starek. *Strojirenstvi,* v. 6, no. 6, June 1956, p. 395-405.

Various kinds of abrasive wear common in pneumatic installations. Method of tests, their results and evaluation from the point of view of practical application. (Q9)

711-Q. (French.) **Mechanical Characteristics of Gray Cast Iron. Verification of the Diagram Drawn Up by A. Collaud.** Michel Ferry. *Fonderie,* no. 124, May 1956, p. 177-184.

Classification of cast irons according to their strength, measured on a test piece taken from a 30-mm. diam. bar. (Q23, CI)

712-Q. (French.) **Mechanical Hysteresis of Metals at High Temperature.** C. Boulanger and C. Crussard. *Métaux, Corrosion-Industries,* v. 31, no. 369, May 1956, p. 203-213.

Investigates influence of polygonization on the modulus of elasticity and on internal friction, heats of activation, critical temperatures and the form of stress-deformation cycles. (Q21, N5, Q22, P12)

713-Q. (French.) **Hard Sintered Alloys and Their Use at High Temperatures.** R. Kieffer, K. Kölbl and K. Pfaffinger. *Métaux, Corrosion-Industries,* v. 31, no. 369, May 1956, p. 233-243.

Properties of titanium carbide alloys and their use in jet-engine and rocket construction.
(Q3, Q4, T25, SG-j, SG-h)

714-Q. (German.) **Forming and Separating Failure in Ferrite Nodular Graphite Cast Iron.** H. Morrough and G. N. J. Gilbert. *Giesserei,* v. 43, no. 14, July 5, 1956, p. 361-368.

Impact tests, effect of chemical composition on brittleness, embrittlement through quenching at temperatures below the transformation region. (Q23, Q6, J26, CI)

715-Q. (Polish.) **The Anisotropy of Cold Formed Polycrystalline Metals.** Wojciech Truszkowski. *Archiwum Hutnictwa,* v. 1, no. 2, 1956, p. 171-182.

New method of calculation consists of measuring deformation in the neck of a strained test piece and calculating the anisotropy coefficient for several cross sections with increasing distance from the smallest cross section in the neck. (Q27, Q24)

716-Q. (Russian.) **The Effect of Nitriding on the Oscillation Decrement in Certain Steels at Normal and at Elevated Temperatures.** M. M. Pisarevskii and S. V. Dianov. *Energomashinostroenie,* no. 5, May 1956, p. 22-24.

Experimental data for a wide range of temperatures on certain pearlite and austenite steels widely used in turbine building. For pearlitic steels, nitriding is found to reduce the oscillation decrement; the opposite is observed in the case of austenitic steels.
(Q8, J28, T25, ST)

717-Q. (Russian.) **Fatigue Strength of Steel Plates With Welded Straps.** I. V. Kudriavstev and N. A. Balabanov. *Svarochnoe Proizvodstvo,* no. 6, June 1956, p. 1-5.

Results of fatigue tests show that their strength is considerably lower than that of plates without straps. High annealing of plates with straps improve their fatigue strength. Normalizing of such plates improves their strength still further.
(Q7, J23, ST)

718-Q. (Russian.) **The Strength of Metals Welded During the Process of Crystallization.** N. N. Prokhorov. *Svarochnoe Proizvodstvo,* no. 6, June 1956, p. 5-11.

Existing hypotheses and suggests an original one regarding the strength of metals. Methods of testing strength of these metals.
(Q23, N5, K1)

719-Q. (Russian.) **A Study of T-Connections Under Action of a Variable Load.** V. Iu. Shishkin, V. A. Makurin and R. Z. Manilova. *Svarochnoe Proizvodstvo,* no. 6, June 1956, p. 11-13.

In welded T-connections, the tensile strength of the joint can be made equal to that of the base metal even if the butted ends have not been fused through completely. Investigates the permissible extent of nonfusion in the joints as well as the effect of an eccentricity in welded parts on the strength of the connection. (Q23, K1)

720-Q. (Russian.) **Impact Tests of Welded Joints.** D. I. Navrotskii. *Svarochnoe Proizvodstvo,* no. 6, June 1956, p. 14-17.

Methods and results of impact tests of welded specimens for determining the critical brittleness and yield points, relative elongation and relative reduction in area. Tensile and bending impact strength of welded joints is found to be not lower than that of the base metal.
(Q6, Q27, K9)

721-Q. (Russian.) **On the Calculation of Stress Relaxation in Metals.** L. M. Shestopalov. *Zhurnal Tekhnicheskoi Fiziki,* v. 26, no. 5, May 1956, p. 1021-1033.

A mathematical treatment of the

problem of relaxation leading to the concept that stress relaxation is indicative of an internal reorganization of the lattice of the real crystal in a nonequilibrium state. (Q25, Q3, M26)

722-Q. (Spanish.) **Tempering Deformations in 12% Chromium and 2% Carbon Ledeburitic Steel.** Francisco Joanxich Ayma. *Instituto del Hierro y del Acero*, v. 9, no. 45, Apr. 1956, p. 364-369.

Investigates influence of tempering temperature on deformability. (Q24, J29, AY)

723-Q. (Spanish.) **Theoretical Systematic Test to Study the Strength of Gray Iron.** Jose Navarro Alcacer. *Instituto del Hierro y del Acero*, v. 9, no. 45, Apr. 1956, p. 425-431.

Effect of graphite shape and size in the metallic matrix. (Q23, M27, CI)

724-Q. (Spanish.) **Etchants for the Study of Temper Brittleness.** Francisco Munoz del Corral, Jose M. Bermudez De Castro y Mosquero. *Instituto del Hierro y del Acero*, v. 9, no. 45, Apr. 1956, p. 478-484.

Study of various etchants proposed for metallographic examination of temper brittleness by using ether solutions of picric acid and alkaline potassium permanganate, an adequate correlation is obtained between the impact values and the microscopic appearance of the test pieces. (Q23, M21)

725-Q. (Spanish.) **Investigation of the Fatigue Strength of Butt-Welded Joints in a Weldable "Lloyd"-Type Spanish Steel.** Zosimo Garcia Martin. *Instituto del Hierro y del Acero*, v. 9, no. 46, May 1956, p. 519-535.

Study of the fatigue strength, under dynamic bending and traction forces, of the base metal, and the effect that the butt-welded joint and the extra thickness of the welding bead have on this strength. (Q7, K3, AY)

726-Q. Internal Stress in Castings. *Foundry Trade Journal*, v. 101, July 5, 1956, p. 19-27.

Review of earlier work, followed by a description of experiments on casting triangular gray-iron grids and determining stress distributions. General recommendations are made on methods for the reduction of internal stress. (Q25, E general, CI)

727-Q. Cause and Prevention of Brittleness in Steel. *Mechanical World and Engineering Record*, v. 136, July 1956, p. 328-331.

Notes from recent research to aid design and construction. (Q23)

728-Q. Electronic Unit Tests Hardness of Gun Barrels. David E. Driscoll and Samuel J. Acquaviva. *Metalworking Production*, v. 100, July 6, 1956, p. 1032-1033.

Electronically operated and controlled bore-hardness tester can accurately measure a 17-ft. tube with bore diameters of 2½ to 4 in. (Q29, ST)

729-Q. Measurement Methods for Wear in Pipe Line Engines and Compressors. J. L. Wilson and S. R. Sawyer. *Pipe Line News*, v. 28, July 1956, p. 36-40.

Analysis of used lubricating oil samples with the emission spectrograph; correlation of the analyses with measured wear rates in engines and with part failures. (Q9)

730-Q. Designing Strain Gage Circuits for Sensitivity and Linearity. Peter K. Stein. *Product Engineering*, v. 27, July 1956, p. 144-149.

Comparison of bridge and potentiometer strain-gage circuits; significance of sensitivity ratings and design for maximum sensitivity; determination of nonlinearity of response. (Q25)

731-Q. Creep Tester Makes Three Basic Tests. *Product Engineering*, v. 27, July 1956, p. 162-163.

Machine uses two head assemblies and a motor-driven leading screw to make possible three types of tests. A compound loading lever which is counterbalanced and kept level makes the unit compact and accurate. (Q3)

732-Q. Elastic Deformation and the Laws of Friction. J. F. Archard. *Research (Supplement)*, v. 9, July 1956, p. S27-S28.

Theoretical analysis suggests that the frictional force may be proportional to the area of contact regardless of the mechanism of deformation. (Q9, Q21)

733-Q. Device for Applying Compression to Small Crystals. Eugene J. Rapperport. *Review of Scientific Instruments*, v. 27, July 1956, p. 446-447.

Applies uniaxial compression to specimens with cross sections up to ¼ in. sq. (Q28)

734-Q. The Yield Behaviour of Mild Steel in Dynamic Compression. J. D. Campbell and J. Duby. *Royal Society, Proceedings*, v. 236, ser. A, July 10, 1956, p. 24-40 + 2 plates.

Stress-time curves are obtained

and analyzed in terms of wave propagation and a dynamic stress-strain relation is derived. Micrographs show that coarse slip does not occur, though there is some evidence of fine slip and grain boundary movement. (Q28, Q24, ST)

735-Q. Bending Tests of Ring-Stiffened Circular Cylinders. James P. Peterson. *U. S. National Advisory Committee for Aeronautics, Technical Note* 3735, July 1956, 14 p.

Twenty-five cylinders were loaded to failure in bending and results are presented in the form of design curves which are applicable to cylinders with heavy rings that fail as a result of local buckling. (Q5)

736-Q. (English.) **Comparison of Theoretical and Experimental Results for 24S-T and 75S-T Aluminium Alloy Columns Buckling in the Elastic and Inelastic Ranges.** Bo Braathen and Bryan R. Noton. *Aeronautical Research Institute of Sweden, Report* 66, 1956, 31 p.

Theoretical results are based on the tangent-modulus theory, the reduced-modulus theory, and the extended Southwell method. Curves indicate that the experimental values are sufficiently well represented by the simple tangent-modulus theory. (Q28, Al)

737-Q. (English.) **Effect of Crack Length and Stress Amplitude on Growth of Fatigue Cracks.** Waloddi Weibull. *Aeronautical Research Institute of Sweden, Report* 65, 1956, 44 p.

The growth rate was strongly influenced by small variations in the mean stress amplitude of an interval. For the tested specimens the rate of growth seemed completely independent of the crack length. (Q7)

738-Q. (Czech.) **Effect of Flame Straightening on the Fatigue Limit of Edged C-Profiles.** Ondrej Puchner. *Zvaranie,* v. 5, no. 4, Apr. 1956, p. 104-106.

Flame straightening of parts of automobile frames is tested to see whether the fatigue limit of the high tensile steels is adversely affected. (Q7, F29, AY)

739-Q. (French.) **A Contribution to the Study of Modified Heat-Resistance 80-20 Ni-Cr Alloys.** M. Mathieu. *Recherche Aéronautique,* no. 51, May-June, 1956, p. 43-51.

A study to determine reasons for breaking of turbine blades. X-ray studies indicate a preferential migration of certain atoms which are a prelude to the formation of precipitates. High degree of homogeneity is necessary to preserve desired properties. Effects of "skin-annealing" on micrographic structure. (Q26, S21, SG-h, Ni, Cr)

740-Q. (French.) **An Analysis of the Notched Bar Impact Test and of the Mechanism of Brittle Fracture.** C. Crussard, R. Borione, J. Plateau, Y. Morillon and F. Maratray. *Revue de Métallurgie,* v. 53, no. 6, June 1956, p. 426-460.

A statistical analysis of the scattering of impact values in the transition field. A new microfractographic method for observation of the fracture appearance with the electronic microscope. Tensile tests at low temperature. (Q6, Q23, ST)

741-Q. (German.) **Influence of Internal Oxidation on the Technical Properties of Silver Alloys.** E. Raub and W. Plate. *Metall,* v. 10, no. 13-14, July 1956, p. 620-626.

Internal oxidation is usually followed by an increase in hardness, a decrease in tensile strength and reduced ductility. Though generally disadvantageous, internal oxidation can be used in manufacturing certain materials which normally are produced only by sintering. (Q23, Q29, R2, Ag)

742-Q. (German.) **The Dependence of the Elasticity Modulus on the State of the Material in the Case of a Silver Alloy.** A. Keil. *Metall,* v. 10, no. 13-14, July 1956, p. 626-628.

A report on measurements of elasticity modulus, tensile strength, ductility and hardness of certain homogeneous silver-cadmium alloys and of those heterogenized by internal oxidation. (Q21, Q23, Q29, R2, Ag, Cd)

743-Q. (German.) **Mechanical Requirements for Copper Wire in Bending and Winding Work.** Fritz O. Glander. *Zeitschrift für Metallkunde,* v. 47, no. 6, June 1956, p. 364-369.

The influence of bending and simultaneous additional tensile load on the mechanical properties of soft and hard copper wire. (Q5, G6, Cu)

744-Q. (German.) **Hardness of Copper-Manganese-Nickel Alloys. II. Investigation of Electrical Resistance.** Otto Dahl and Karl-Ludwig Dreyer. *Zeitschrift für Metallkunde,* v. 47, no. 6, June 1956, p. 370-378.

The change in electrical resistance in relation to temperature and time of hardening was measured. (Q29, P15, J27, Cu, Mn, Ni)

745-Q. (German.) **Tensile Deformation of Copper Single Crystals. II. Linear**

Inhomogeneity and Reproducibility of Stress-Strain Curves. Jörg Diehl. *Zeitschrift für Metallkunde,* v. 47, no. 6, June 1956, p. 411-416.

Inhomogeneities of strain are primarily due to pronounced variations of the coefficient of work hardening in stage I of the stress-strain curve. Phenomena may be caused by fluctuations in the linear structure of the crystals. (Q24, Q27, Cu)

746-Q. (Portuguese.) **Limitations in the Use of Hardness Tests as a Method of Investigation of the Mechanical Properties of Tempered and Annealed Steels.** Alberto Albuquerque Arantes. *ABM (Boletim da Associacao Brasileira de Metais),* v. 12, no. 43, Apr. 1956, p. 135-143.

Analysis of the relationships between hardness, tensile strength, impact value and wear resistance of various steels, showing the inadequacy of hardness tests as a method of investigating mechanical properties, even when the chemical composition of the steel and its Jominy curve are known. (Q general, Q29, ST)

747-Q. (Russian.) **A Radiographic Study of Phenomena Accompanying Stretching of Steel Over Extended Periods at Higher Temperaures.** M. Ia. Fuks, N. V. Slonovskii and L. I. Lupilov. *Fizika Metallov i Metallovedenie,* v. 2, no. 2, 1956, p. 328-338.

A quantitative radiographic evaluation of the degree of diminution of cohesion domains and of the magnitude of microstresses in carbon and chromium-nickel-molybdenum steels plastically deformed by stretching at various temperatures and rates. ((Q24, Q25, ST)

748-Q. (Russian.) **Vickers and Rockwell Hardness as Functions of the Plastic Parameters of the Metal and of the Test Conditions.** G. P. Zaitsev. *Fizika Metallov i Metallovedenie,* v. 2, no. 2, 1956, p. 339-350.

Deduces formulas and plots curves of errors in hardness measurements to take account of the deviation of actual test conditions from the norm, and to allow for the plastic properties of individual metals. (Q29, Q23,)

749-Q. (Russian.) **The Influence of the Cross-Sectional Configuration of the Specimen on the Magnitude of Axial Deformation Stresses in Compression.** V. E. Panin. *Fizika Metallov i Metallovedenie,* v. 2, no. 2, 1956, p. 357-360.

An experimental proof of the theoretical conclusion that magnitude of axial stresses depends on the form of the cross section of specimens of the same cross-sectional area. (Q28, Q25)

750-Q. The Problem of Fatigue Strength in Aircraft Structures. E. Gassner. *Aircraft Engineering,* v. 28, July 1956, p. 228-234.

A survey with recommendations for design rules based on recent research. (Q7)

751-Q. A Fundamental Investigation of Hydrogen Embrittlement in Zirconium. Arthur P. Young and Charles M. Schwartz. *Battelle Memorial Institute, (U. S. Atomic Energy Commission),* BMI-1100, June 1956, 21 p.

Hydrogen embrittlement in zirconium is apparently due to microcrack formation at hydride-zirconium interfaces. There is some evidence that embrittlement decreases with decreasing grain size and is abnormally enhanced by slow prestrain before impact. (Q23, Zr)

752-Q. The "Ploughing" Contribution to Friction. R. T. Spurr. *British Journal of Applied Physics,* v. 7, July 1956, p. 260-261.

Expressions are derived which enable the ploughing component to be calculated for two types of asperity, namely, spheres and wedges. (Q9, Cu, Al, ST)

753-Q. Crack Arresting by Overlays of Notch-Tough Weld Metal. P. P. Puzak and W. S. Pellini. *Bureau of Ships Journal,* v. 5, Aug. 1956, p. 9-12.

Demonstrates effectiveness of this technique by illustrated examples. (Q26, L24)

754-Q. Mechanical Properties of a Normalized and Drawn Cast Boron Steel. S. L. Gertsman, D. K. Faurschou and R. K. Buhr. *Foundry,* v. 84, Aug. 1956, p. 92-99.

Effects of rare earth additions on properties. (Q general, B22, ST)

755-Q. Wear Resistance. W. G. Cass. *Iron & Steel,* v. 29, July 1956, p. 342.

Recent Russian research on different surface treatments for machine parts. (Q9)

756-Q. Fracture in Metals. N. F. Mott. *Iron and Steel Institute, Journal,* v. 183, July 1956, p. 233-243.

Ductile fracture, brittle fracture especially of ferrous metals and fatigue discussed in terms of the theory of dislocations. (Q26, Fe)

757-Q. (English.) **Studies on the Wetting Effect and the Surface Tension**

of Solids, the Change in Cutting Resistance of Aluminium Due to Wetting by Several Liquids. Mizuho Sato. *Japan Academy, Proceedings,* v. 32, no. 5, May 1956, p. 336-338.

With a test machine the cutting resistance is observed by the deflection of a beam which is constructed with two co-axial metallic cylinders. (Q29, P10, Al)

758-Q. The Embrittlement of Tungsten by Ammonia. G. L. Davis. *Metallurgia,* v. 54, no. 321, July 1956, p. 18-20.

The embrittling action seems to be due to reaction with ammonia itself, rather than its dissociation products, and is associated with the presence of nitride as an insoluble phase. (Q23, W)

759-Q. Influence of Rate of Load Application on the Tensile Strength of Cast Irons. H. K. Lloyd. *Metal Treatment and Drop Forging,* v. 23, July 1956, p. 281-287.

Extremes in testing speed can cause appreciable variations in the results of tensile-strength tests on cast iron which may be masked during routine testing. (Q27, CI)

760-Q. Resistance to Fatigue Stressing of Wood-to-Metal Joints Glued With Several Types of Adhesives. H. W. Eickner, E. A. Mraz and H. D. Bruce. *U. S. Department of Agriculture, Forest Products Laboratory, Report No.* 1545, July 1955, 9 p.

Shear and cantilever load tests were made on individual joints prepared with several processes. (Q7, K12)

761-Q. Fatigue of Sandwich Constructions for Aircraft. Aluminum Facing and Expanded-Aluminum-Honeycomb Core Sandwich Material Tested in Shear. Fred Werren. *U. S. Department of Agriculture, Forest Products Laboratory, Report No.* 1559-K, July 1952, 7 p.

Method of bonding core to facings is important factor in shear strength and fatigue properties. (Q7, Q2, Al)

762-Q. Strength of Aluminum Lap Joints at Elevated Temperatures. (Tests Conducted Immediately After the Temperature Was Reached.) Edward W. Kuenzi. *U. S. Department of Agriculture, Forest Products Laboratory, Report No.* 1808, May 1954, 33 p.

At elevated temperatures, the highest strengths were obtained with a high-temperature setting formulation of thermosetting resin and synthetic rubber. The highest strengths at room temperature were obtained with a high-temperature setting modified-phenol-polyvinyl butyral adhesive. (Q23, K12, Al)

763-Q. Nature of Plastic Deformation of Surface Zones of Working Parts. K. V. Savitskii and M. P. Zagrebennikova. *Henry Brutcher, Translation No.* 3765, 7 p. Henry Brutcher, Altadena, Calif. (From *Doklady Akademii Nauk SSSR,* v. 103, no. 4, 1955, p. 605-608.)

Previously abstracted from original. See item 1035-Q, 1955. (Q29, Al, Cu)

764-Q. (French.) **A Study of the Brittleness of Steel for Hulls Using U and V-Notch Charpy Tests.** A. Audige. *Revue de la soudure* (Brussels), v. 12, no. 2, Feb. 1956, p. 112-122.

Some recommended tests. Comparison of the French tests with those run in other countries. Tests on 41 to 50-kg. steels. (Q23, Q6, ST)

765-Q. (German.) **Deformation and Separation Cracks in Ferritic Nodular Graphite Cast Iron.** H. Morrogh and G. N. J. Gilbert. *Giesserei,* v. 43, no. 15, July 19, 1956, p. 390-397.

Thermal treatment and fine structure. Embrittlement as result of annealing at temperatures below transformation region. Comparison of cracks in notched and unnotched tension and impact tests. (Q general, J23, N8, CI)

766-Q. (German.) **Stress Distribution in Pretensioned Prestressed Beams Executed on Photoelastic Models With Various Eccentricities of Bond Stress.** H. H. Racké. *Schweizer Archiv für Angewandte Wissenschaft und Technik,* v. 22, no. 6, June 1956, p. 169-177.

Results of model studies. (Q25)

767-Q. (Book—German.) **Handbook of Materials Testing. Testing of Metal Materials.** E. Siebel, editor. v. II. 2nd Rev. Ed. 754 p. 1955. Springer-verlag, Berlin, Germany.

Metal fundamentals. Mechanical and physical testing methods. (Q general, P general)

768-Q. (Book.) **Society for Experimental Stress Analysis, Proceedings, (Annual Volume),** v. 13, no. 2, 1956, 197 p. Society for Experimental Stress Analysis, Central Square Station, P. O. Box 168, Cambridge 39, Mass.

Pertinent papers are individually abstracted. (Q25)

769-Q. An Impact Test for Use With Cermets. Edwin J. Soxman, James R. Tinklepaugh, and Martin T. Curran. *American Ceramic Society, Journal,* v. 39, Aug. 1956, p. 261-265.

Advantages, limitations and possible use of the Charpy drop test. (Q6, C-n)

770-Q. Analysis of the Stresses in a Cutting Edge. F. R. Archibald. *ASME Transactions,* v. 78, Aug. 1956, p. 1149-1154.

Equations for the stress components at any point of the tool tip. (Q25, G17)

771-Q. The Stress-Hardness Relation. Aram Dervishyan. *ASTM Bulletin,* 1956, no. 215, July, p. 71-75.

Theoretical considerations and experimental results showing that stress and hardness have a linear relationship. Potential applications. (Q29, Q25)

772-Q. Conditions of Failure in Some Turbine Diaphragm Blades. K. H. Khalil. *Engineer,* v. 202, July 20, 1956, p. 78-80.

Failure appeared to be due to the change in pressure at both faces of the aerofoil blade, being comparatively positive at the concave and negative at the convex side with respect to the ambient pressure in the stage. A vortex wake is thus formed downstream initiating vibration of the blade edge. (Q26)

773-Q. Influence of Rate of Solidification on the Mechanical Properties of Cu-Sn-Zn and Cu-Sn-P Alloys. P. J. Le Thomas and D. Arnaud. *Foundry Trade Journal,* v. 101, July 12, 1956, p. 51-57.

Tensile tests were accompanied by macrographic and micrographic examination. (Q23, N12, Sn, Zn, Cu)

774-Q. How Carbon Content Affects Impact Properties. H. Schwartzbart and J. P. Sheehan. *Iron Age,* v. 178, Aug. 9, 1956, p. 85-89.

Properties of eight common structural alloy steels examined at various carbon levels. No one grade is superior at all carbon and hardness levels. (Q6, Q23, CN)

775-Q. How Boron, Grain Size Affect Impact Properties. II. H. Schwartzbart and J. P. Sheehan. *Iron Age,* v. 178, Aug. 16, 1956, p. 102-106.

Both have important effects on the impact strength of low alloy steels, along with carbon and alloy content. (To be continued.) (Q6, M27, AY)

776-Q. X-Ray Studies of Stresses in Metals. *National Bureau of Standards, Technical News Bulletin,* v. 40, Aug. 1956, p. 105-107.

Suggests new explanation of residual strain balancing. (Q25, N22)

777-Q. The Creep of Cadmium Crystals at Liquid Helium Temperatures. J. W. Glen. *Philosophical Magazine,* v. 1, 8th ser., no. 5, May 1956, p. 400-408.

Suggests that creep is due to the quantum mechanical tunnel effect, which allows dislocations to penetrate barriers to their motion that cannot be overcome by the action of the applied stress alone. (Q3, Cd)

778-Q. The Internal Friction of Cold Worked Copper at Low Temperatures. D. H. Niblett and J. Wilks. *Philosophical Magazine,* v. 1, 8th ser., no. 5, May 1956, p. 415-418.

Measurements were made on bars of copper which were first annealed in argon for one hour at 600° C. and then plastically deformed in a tensiometer. (Q22, Cu)

779-Q. A Study of Lubrication in Relation to Continuous Metal-Deformation Processes. L. H. Butler. *Sheet Metal Industries,* v. 33, no. 352, Aug. 1956, p. 571-577.

Reviews and relates existing knowledge of friction and lubrication through the specific case of bulk metal flow and quotes the results of some experimental work. (To be continued.) (Q9, Q24)

780-Q. Damage to Metals During Prolonged Loading at Elevated Temperatures. Ya. B. Fridman and B. A. Drozdovskii. *Henry Brutcher, Translation No.* 3504, 6 p. (From *Doklady Akademii Nauk SSSR,* v. 95, no. 4, 1954, p. 793-796.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 588-Q, 1954. (Q general, Cr, Ni)

781-Q. Behavior of Graphite Nodules in the Plastic Deformation of Ductile Iron. B. Sigg. *Henry Brutcher, Translation No.* 3726, 4 p. (Translated from *Schweizer Archiv,* v. 21, no. 5, 1955, p. 148-150.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 669-Q, 1955. (Q24, CI)

782-Q. Effect of Deoxidation With Aluminum Upon the Irreversible Temper Brittleness of Structural Alloy Steels. E. N. Sokolkov, G. V. Gaidukov and V. D. Sadovskii. *Henry Brutcher, Translation No.* 3743, 4 p. (From *Fizika Metallov i Metallovedenie,* v. 1, no. 2, 1955, p. 366-367.) Henry Brutcher, Altadena, Calif.

Evidence points to grain refinement induced by aluminum additions as the principal factor in reducing the incidence of temper brittleness in steel. (Q23, Al, AY)

783-Q. Iron-Copper-Graphite Porous Antifriction Alloys. V. E. Mikryukov and N. Z. Pozdnyak. *Henry Brutcher, Translation No.* 3746, 11 p. (Abridged

from *Vestnik Mashinostroeniya,* v. 36, no. 2, 1956, p. 52-56.) Henry Brutcher, Altadena, Calif.

Mechanical properties and structural homogeneity of compacts as function of copper content; results of tests for coefficient of friction and rate of wear. (Q9, H15, Fe, Cu)

784-Q. Composition-High Temperature Strength Diagram for Nickel-Tungsten System. I. I. Kornilov and P. B. Budberg. *Henry Brutcher, Translation No.* 3747, 6 p. (From *Doklady Akademii Nauk, SSSR,* v. 100, no. 1, 1955, p. 73-75.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 389-Q, 1955. (Q3, Q23, Ni, W)

785-Q. Influence of the Ratio of Areas of Friction Upon Wear. D. N. Garkunov. *Henry Brutcher, Translation No.* 3764, 4 p. (From *Doklady Akademii Nauk SSSR,* v. 104, no. 2, 1955, p. 227-228.) Henry Brutcher, Altadena, Calif.

Relationship between ratio of gravimetric wear of two materials (like with like and with unlike) in frictional contact, and ratio of their surface areas of friction. (Q9)

786-Q. (German.) **Effects of Small Chromium and Nickel Contents on the Properties of Steel Products.** Alexander Schepers and Richard Krauss. *Stahl und Eisen,* v. 76, no. 14, July 12, 1956, p. 896-903.

Effects on mechanical and technological properties. (Q general, ST)

787-Q. (German.) **Problem of Brittleness.** Eduard Houdremont and Heinrich Mussmann. *Stahl und Eisen,* v. 76, no. 14, July 12, 1956, p. 903-907.

Transformation processes and temperatures. Significance of the energy released during the breaking process. (Q23, N8, ST)

788-Q. (Russian.) **Preventing a High Degree of Brittleness of Hot Rolled Transformer Steel.** V. A. Koroleva and M. I. Sherstiuk. *Stal',* v. 16, no. 6, June 1956, p. 545-548.

Possible effect on brittleness of high silicon content, hydrogen absorption during etching and grain growth and the deposition along grain boundaries of a brittle component such as structurally free cementite. The last is the most important factor and can be eliminated by repeated annealing under vacuum at 800 to 900° C. (Q23, N8, J23, SG-p)

789-Q. (Russian.) **Effect of Arsenic on Impact Toughness of Rail Steel.** L. M. Shkol'nik. *Stal',* v. 16, no. 6, 1956, p. 548-553.

Relation of phosphorus and arsenic contents and temperature to notch toughness and brittleness. Effect of other elements such as carbon and manganese. (Q23, Q6, ST)

790-Q. (Russian.) **Plastic After Effect in Metals.** D. M. Vasil'ev and L. S. Evlashin. *Zhurnal Tekhnicheskoi Fiziki,* v. 26, no. 6, June 1956, p. 1351-1356.

Observations of the residual change in dimensions of specimens when heated after previous plastic deformation by bending or twisting. Contrast between types of after effect in unalloyed carbon steel and alloy steel. (Q25, Q23, P10, CN, AY)

791-Q. (Russian.) **Nature of After Effect in Metals.** D. M. Vasil'ev. *Zhurnal Tekhnicheskoi Fiziki,* v. 26, no. 6, June 1956, p. 1357-1365.

Relation of length of time of relaxation of plastically deformed specimens to temperature and rate of heating. Analysis of dimensional changes taking place during after effect leads to the concept of the existence of oriented microstresses. (Q25, Q23, P10, ST)

792-Q. How Fracture Type, Specimen Size Affect Impact Properties. III. H. Schwartzbart and J. P. Sheehan. *Iron Age,* v. 178, Aug. 23, 1956, p. 107-110.

In martensitic structures, both ductile and brittle fractures are traced to tempering temperature. Effect of specimen size is generally more pronounced at higher hardnesses. (Q26, Q6, AY)

793-Q. How to Control Weld Distortion Within Close Limits. John Mikulak. *Iron Age,* v. 178, Aug. 30, 1956, p. 88-90.

Weld distortion controlled within close limits by predicting and then correcting residual stresses. (Q25, K1, J1)

794-Q. Deformation and Recrystallization of Silicon Iron. George Wiener and Robert Corcoran. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, sec. 2, Aug. 1956, p. 901-906.

A study of the orientation and microstructure of 3% Si-Fe alloys after deformation and recrystallization. (Q24, N5, Fe)

795-Q. Effect of Testing Variables on the Hydrogen Embrittlement of Titanium and a Ti-8 Pct. Mn Alloy.

R. I. Jaffee, G. A. Lenning and C. M. Craighead. *Journal of Metals*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, sec. 2, Aug. 1956, p. 907-913.

Effects of increasing hydrogen content, introducing a notch, and changing the strain rate on properties of titanium and one of its alloys were investigated over a range of testing temperatures from —196 to 200° C. (Q23, Ti)

796-Q. Further Studies of the Properties of Rhenium Metal. Chester T. Sims and Robert I. Jaffee. *Journal of Metals*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, sec. 2 Aug. 1956, p. 913-917.

The thermo-electric behavior of the Pt—Pt-Re thermocouple and the resistance of rhenium to attack by certain molten metals. Data on the stress-rupture behavior of drawn wire, the tensile characteristics of rolled sheet, the variation of Young's modulus with temperature, and the effect of specimen size and fabrication method on the work hardenability. Mechanical properties of thoriated rhenium.
(Q23, Q21, Q29, P15, Re)

797-Q. Hydrogen Embrittlement of Beta-Stabilized Titanium Alloys. C. M. Craighead, G. A. Lenning and R. I. Jaffee. *Journal of Metals*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, sec. 2, Aug. 1956, p. 923-928.

The α-β type alloys are subject to a loss of tensile ductility with increasing hydrogen content. Embrittlement encountered appeared to be of the strain-aging type. Both compositional and structural factors are shown to influence the hydrogen tolerance of α-β type alloys.
(Q23, Ti)

798-Q. Possible Role of Diffusion in the Creep of Alpha and Gamma Iron. Oleg D. Sherby and Jack L. Lytton. *Journal of Metals*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, sec. 2, Aug. 1956, p. 928-930.
(Q3, Ni, Fe)

799-Q. Correlation of the Tensile Properties of Pure Magnesium and Four Commercial Alloys with Their Mode of Fracturing. M. W. Toaz and E. J. Ripling. *Journal of Metals*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, sec. 2, Aug. 1956, p. 936-946.

Materials and procedure, tensile test results, microscopic investigation. (Q26, Q27, Mg)

800-Q. Preferred Orientations and Magnetic Properties of Rolled and Annealed Permanent Magnet Alloys. W. R. Hibbard, Jr. *Journal of Metals*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, sec. 2, Aug. 1956, p. 962-967.

Pole figures, torque curves and coercive force determined for Cunife, Cunico, Silmanal, Vicalloy I, Vicalloy II and Heusler's Alloy.
(Q24, P16, SG-n)

801-Q. Observations on the Brittle Fracture of Cemented Titanium Carbide. J. R. Low, Jr. *Journal of Metals*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, sec. 2, Aug. 1956, p. 982-984.

Material used in this study was a TiC-Inconel cermet prepared by infiltration (50% TiC, 50% Inconel: designated as TC66-I).
(Q26, H16, Ni, Ti)

802-Q. Internal Friction Studies on Silver and Certain Silver-Base Solid Solutions. S. G. Holder, Jr., E. E. Stansbury and J. H. Frye, Jr. *Journal of Metals*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, sec. 2, Aug. 1956, p. 993-997.

Internal friction studies on annealed and cold-worked pure silver and alloys of silver with 4.5 at. % each of Cd, Sn and Sb. (Q22, Au)

803-Q. The Effect of Composition on the Mechanical Properties of Al-Si-Cu-Mg Casting Alloys. M. G. Gittins and W. E. Mew. *Metallurgia*, v. 54, no. 322, Aug. 1956, p. 71-76.

Influence of copper and magnesium content on mechanical properties. (Q general, Al, Si, Cu, Mg)

804-Q. Mechanical Testing of Steel. S. Visvanathan. *Tisco*, v. 3, July 1956, p. 75-85.

Objects of mechanical testing, description of tests employed, variables affecting test data.
(Q general, ST)

805-Q. Low-Temperature Properties of Steels. S. N. Anant Narayan. *Tisco*, v. 3, July 1956, p. 86-94.

Necessity for a thorough knowledge of the mechanical properties of steels at low temperatures. Changes in the tensile properties with decreasing temperature. Notch-sensitivity of ferritic steels and brittle fracture. Effect of chemical composition, structure and steelmaking and rolling processes. Influence of design and methods of fabrication. Choice of steels for low-temperature service. (Q23, Q26, ST)

806-Q. The Influence of Steelmaking Practice on the Mechanical Properties of Steel. J. S. Vatchagandhy. *Tisco,* v. 3, July 1956, p. 113-123.

Factors in steelmaking processes influencing the mechanical properties of the product, comparison of acid, basic and Bessemer steels, effect of nitrogen content, features of the electric, duplex, and oxygen steelmaking processes, influence of trace elements.
(Q general, D general, ST)

807-Q. Influence of Mechanical Treatment on the Properties of Steel. P. K. Chakravarty. *Tisco,* v. 3, July 1956, p. 124-134.

Effects of hot rolling, press forging and hammer forging on strength and ductility; influence of cold rolling, cold drawing, cold extrusion and cold heading operations, limitations of cold working owing to work-hardening characteristics; plastic cycles; anisotropy of hot and cold-worked steel, improvement in fatigue limit by surface cold work. (Q general, F general, G general, ST)

808-Q. Influence of Thermal Treatment on the Mechanical Properties of Steels. G. K. Bapat. *Tisco,* v. 3, July 1956, p. 135-143.

Necessity of heat treatment for obtaining desired balance of mechanical properties, changes in the properties of 0.40% carbon steel by various heat treatments, relation of properties with microstructure, heat treatment as a method of obtaining the desired structure and surface hardening of steel.
(Q general, J general, M27, ST)

809-Q. Theories of Fracture. V. G. Paranjpe. *Tisco,* v. 3, July 1956, p. 144-152.

Various types of fractures, divergence between theoretical and observed strengths, theories of brittle and ductile fractures, brittle fracture in normally ductile materials, fatigue and intercrystalline failures, effect of structural heterogeneity on initiation and propagation of fracture. (Q26)

810-Q. Effects of Neutron Bombardment Upon the Properties of ASTM Type SA2112B Steel. M. L. Bleiberg. *Westinghouse Electric Corporation, Atomic Power Division (U. S. Atomic Energy Commission),* WAPD-T-206, Oct. 1955, 48 p.

Purpose of investigation: to determine changes in impact strength of 0.29% carbon boiler plate steel as a result of neutron bombardment and correlate changes with neutron flux intensity; interpret nature of embrittlement mechanism, correlating impact data with hardness and electrical resistivity; remove "radiation damage" by annealing heat treatments. (Q6, Q29, P15, AY)

811-Q. (English.) The Relationship Between Load Spectra and Fatigue Life. Bo Lundberg and Sigge Eggwertz. *Aeronautical Research Institute of Sweden, Report no.* 67, 1956, 32 p.

Load spectra for fighter and transport planes can be approximated by a straight line in a semilog plot. The important parameter of straight-line spectra is the slope, the possible variation of which is analyzed. (Q7)

812-Q. (French.) The Variation of the Mechanical Properties of Gray Cast Irons in Relation to Their Thickness. M. Michel Ferry. *Fonderie,* 1956, no. 126, July 1956, p. 267-273.

A theoretical study of the simultaneous variation of tensile strength, modulus of elasticity and hardness of gray cast irons as a function of thickness. (Q23, Q21, Q29, CI)

813-Q. (French.) Periodic Creep of Heat Resisting Alloys. Georges Vidal. *Revue de Métallurgie,* v. 53, no. 7, July 1956, p. 485-496.

Tests were carried out at 800° C. on a "Nimonic 90" alloy, used for the making of aeronautic turboreactor blades. (Q3, T24, Ni)

814-Q. (German.) Influence of Microstructure on the Fatigue Strength of Wrought Aluminum Alloys. E. Straube. *Aluminium,* v. 32, no. 8, Aug. 1956, p. 476-479.

Practical examples show the effect of microstructure and homogeneity on the fatigue strength of heat treatable alloys. (Q7, M27, Al)

815-Q. (German.) Effect of Pores in Welded Butt Joints. B. Lauterberg. *Oerlikon Schweissmitteilungen,* v. 14, no. 25, Aug. 1956, p. 5-19.

Static strength, brittle fracture, fatigue strength, preparation of experimental specimens and method of testing. (Q23, Q7, K9)

816-Q. (German.) Properties of Austenitic Steels Having High Strength at Elevated Temperatures Which Were Melted Under Reduced Pressure. Karl Bungardt and Heribert Sychrovsky. *Stahl und Eisen,* v. 76, no. 16, Aug. 9, 1956, p. 1040-1047; disc., p. 1047-1049.

Behavior of alloying and accompanying elements of the steel in melts originating from the vacuum-melting induction furnace.
(Q general, D8, AY)

817-Q. (Russian.) **The Nature of Reversible and Nonreversible Temper Brittleness in Structural Steel.** V. S. Meskin. *Metallovedenie i Obrabotka Metallov,* no. 7, July 1956, p. 24-34.

Theoretical discussion. (Q23, ST)

818-Q. (Russian.) **Causes of Nonreversible Annealing Brittleness.** B. A. Stetsenko. *Metallovedenie i Obrabotka Metallov,* no. 7, July 1956, p. 35-38.

Decrease in toughness of the steel in tempering cannot be explained solely by the decomposition of the residual austenite. (Q23, J29, N8, ST)

819-Q. (Russian.) **Effects of the Material of Surrounding Parts on the Fatigue Strength of Axles and Shafts.** I. V. Kudriatsev and N. M. Savvina. *Vestnik Mashinostroeniia,* v. 36, no. 7, July 1956, p. 10-14.

A study of the decrease in fatigue strength of axles and shafts where they are in contact with fixed parts, such as the inner races of roller bearings. (Q7)

820-Q. Effect of Vacuum Degassing on Properties of Aluminum Alloys. E. E. Layne and H. F. Bishop. *Foundry,* v. 84, Sept. 1956, p. 118-123.

Investigation of the extent to which gas elimination by vacuum treatments may improve mechanical properties. (Q general, E25, Al)

821-Q. Brinell Hardness Testing. J. Léonard. *Foundry Trade Journal,* v. 101, Aug. 16, 1956, p. 173-175.

The 2.5 mm.-187.5 kg. combination of ball and load permits accurate reading, testing close to an edge, impressions close to one another, appreciation of scatter and good average results. (Q29)

822-Q. Elastoplastic Thick-Walled Tubes of Work-Hardening Material Subject to Internal and External Pressures and to Temperature Gradients. D. R. Bland. *Journal of the Mechanics and Physics of Solids,* v. 4, Aug. 1956, p. 209-229.

Using Tresca's yield criterion and its associated flow rule, solutions are obtained for the stresses, the elastic and plastic strains, and the displacements. (Q25)

823-Q. Creep of Polycrystalline Aluminium as Determined From Strain Rate Tests. J. Weertman. *Journal of the Mechanics and Physics of Solids,* v. 4, Aug. 1956, p. 230-234.

Tests of high-purity aluminum over a wide temperature range. (Q3, Al)

824-Q. The Plastic Yielding of Shallow Notched Bars Due to Bending. A. P. Green. *Journal of the Mechanics and Physics of Solids,* v. 4, Aug. 1956, p. 259-268 + 1 plate.

Plain strain solutions are modified for shallow notched bars, so that plastic deformation extends to the notched face. (Q24, Q5)

825-Q. Creep Relaxation for Combined Stresses. J. E. Griffith and Joseph Marin. *Journal of the Mechanics and Physics of Solids,* v. 4, Aug. 1956, p. 283-293.

Develops a theory for predicting stress relaxation-time relations for creep in the case of combined stresses based on an assumed constant stress-creep-time relation. (Q3, Al)

826-Q. Scatter of Fatigue Life of Structural Steel and Its Influence on Safety of Structure. Ichiro Konishi and Masanobu Shinozuka. *Kyoto University, Memoirs of the Faculty of Engineering,* v. 18, no. 2, Apr. 1956, p. 73-83.

The frequency distribution was interpreted by the theory of the stochastic process. (Q7, S21, ST)

827-Q. Induction Hardening as a Means of Increasing the Resistance to Wear of Internal Combustion Engines and Machinery. G. W. Seulen. *Metal Treatment and Drop Forging,* v. 23, Aug. 1956, p. 305-310, 314.

Latest equipment and machines, modern techniques employed. (Q9, J2, ST)

828-Q. Physical & Metallurgical Aspects of Creep. I. Physical Considerations. L. A. Phelps. *Metal Treatment and Drop Forging,* v. 23, Aug. 1956, p. 311-314.

Various theories of the mechanism of creep in metals. (Q3)

829-Q. The Fatigue of Rock-Drill Rods. D. S. Kemsley. *Mine & Quarry Engineering,* v. 22, Sept. 1956, p. 386-389.

Concludes that the majority of steel rock drill rod fatigue failures are due to corrosion fatigue, rather than dry fatigue or to a purely mechanical stress distribution. (Q7, S21, TS)

830-Q. Creep in Metal Crystals at Very Low Temperatures. N. F. Mott. *Philosophical Magazine,* v. 1, 8th ser., no. 6, June 1956, p. 568-572.

Theory based on the hypothesis that dislocations can pass through barriers, such as those provided by dislocations crossing the slip plane, owing to the quantum-mechanical tunnel effect. (Q3, M26)

831-Q. The Stages in a Process of Severe Metallic Wear. M. Kerridge and J. K. Lancaster. *Royal Society, Proceedings,* v. 236, ser. A, Aug. 2, 1956, p. 250-264 + 1 plate.

Radioactivity methods used to study the wear of brass against a harder material under conditions where the debris produced was metallic. (Q9, Cu)

832-Q. The Wear of Metals Under Unlubricated Conditions. J. F. Archard and W. Hirst. *Royal Society, Proceedings,* v. 236, ser. A, Aug. 2, 1956, p. 397-410 + 1 plate.

The wear rate is accurately proportional to the load where the same surface conditions exist. Once equilibrium surface conditions are established, the wear rate is independent of the apparent area of contact. (Q9)

833-Q. How Shot Peening Improves Fatigue Strength. H. J. Grover. *SAE Journal,* v. 64, Aug. 1956, p. 28-30.

Three ways in which the method may be expected to influence fatigue strength. Surface roughening of previously polished surfaces lowers fatigue strength, while surface work hardening and residual stresses usually improve it. (Q7, G23, ST)

834-Q. Some Experiments in the Lubrication of Stainless Steels. I. G. D. Jourdan. *Scientific Lubrication,* v. 8, Aug. 1956, p. 14-18.

Studies of the ability of a range of additive type, paraffinic base, mineral oils to "wet" a range of materials. Determination of friction, temperature and wear features of bearing materials running under load. (Q9, SS)

835-Q. Effects of Intermittent Versus Continuous Heating Upon the Tensile Properties of 2024-T4, 6061-T6 and 7075-T6 Alloys. G. W. Stickley and H. L. Anderson. *U. S. National Advisory Committee for Aeronautics, Technical Memorandum* 1419, Aug. 1956, 7 p.

Determination of the effects of intermittent and continuous heating at 300 and 400° F. for periods of 100 and 200 hr. (Q27, Al)

836-Q. Fatigue-Crack Propagation in Aluminum-Alloy Box Beams. Herbert F. Hardrath, Herbert A. Leybold, Charles B. Landers and Louis W. Hauschild. *U. S. National Advisory Committee for Aeronautics, Technical Note* 3856, Aug. 1956, 33 p.

Specimens with bonded stringers had lower rates of crack growth than other specimens. Rapid rate of crack propagation was found in specimens having covers that were integrally stiffened. (Q7, Al)

837-Q. Slip, Twinning and Fracture in Single Crystals of Iron. J. J. Cox, G. T. Horne, and R. F. Mehl. *American Society for Metals, Transactions,* v. 49, *Preprint No.* 1, 1956, 18 p.

The slip, twinning and fracture characteristics of single crystals of decarburized mild steel were investgated at temperatures from 392 to −321° F. (Q24, Fe)

838-Q. Dynamc Biaxial Stress-Strain Characteristics of Aluminum and Mild Steel. George Gerard and Ralph Papirno. *American Society for Metals, Transactions,* v. 49, *Preprint No.* 2, 1956, 22 p.

New technique for obtaining dynamic stress-strain characteristics of circular diaphragms in the yield region. Utilizes the impact tube for rapidly applying a pressure wave to the diaphragm. (Q23, Q6, Al, CN)

839-Q. Some Exploratory Observations of the Tensile Properties of Metals at Very Low Temperatures. E. T. Wessel. *American Society for Metals, Transactions,* v. 49, *Preprint No.* 3, 1956, 26 p.

Metals with a body-centered cubic lattice structure were the only ones to show a strong dependence of yield strength upon temperature. Quenched and tempered steels and beta-brass exhibited considerable plastic deformation in tests at 4.2° K. Plastic deformation occurred primarily by a series of repeated discontinuous yields. (Q general)

840-Q. Effect of Strain Rate and Temperature on the Plastic Deformation of High Purity Aluminum. T. A. Trozera, O. D. Sherby and J. E. Dorn. *American Society for Metals, Transactions,* v. 49, *Preprint No.* 4, 1956, 14 p.

Over wide ranges of temperature and strain rate, identical stress-strain curves are obtained at identical values of the Zener-Hollomon parameter Z. (Q24, Q27, Al)

841-Q. The Effect of Subboundaries and Carbide Distribution on the Notch Toughness of an Ingot Iron. J. C. Danko and R. D. Stout. *American Society for Metals, Transactions,* v. 49, *Preprint No.* 5, 1956, 13 p.

Solution treated, quenched and aged ingot iron had a transition temperature approximately 100° F. lower than annealed iron of the same ferrite grain size. An increase in subboundaries raised the transition temperature. (Q23, Q6, Fe)

842-Q. Notch Ductility of Malleable Irons. G. A. Sandoz, N. C. Howells, H. F. Bishop and W. S. Pellini. *American Society for Metals, Transactions,* v. 49, *Preprint No.* 6, 1956, 33 p.

Drop-weight tests were conducted

to establish the temperature at which there is complete loss of ductility in the presence of a sharp, crack-like notch. (Q23, CI)

843-Q. The Deformation and Rupture of Gray Cast Iron. W. R. Clough and M. E. Shank. *American Society for Metals, Transactions,* v. 49, *Preprint* No. 8, 1956, 26 p.

Density decrease during plastic deformation is a smooth function of applied stress, and is greater for biaxial tensile stressing than for uniaxial stressing. Fracture occurs in a direction normal to the greatest stensile stress, and is mostly of a ductile nature. (Q24, Q26, CI)

844-Q. Relative High Temperature Properties of the Hexagonal-Closed-Packed and Body-Centered-Cubic Structures in Iodide-Titanium. John Lunsford and Nicholas J. Grant. *American Society for Metals, Transactions,* v. 49, *Preprint No.* 9, 1956, 12 p.

Stress-to-rupture properties of iodide-titanium were investigated in air from 1000 to 1990° F. around the alpha-to-beta transformation temperature of 1620° F. (Q general, Ti)

845-Q. The Influence of Alloying on the Elastic Modulus of Titanium Alloys. W. H. Graft, D. W. Levinson and W. Rostoker. *American Society for Metals, Transactions,* v. 49, *Preprint No.* 10, 1956, 17 p.

Using a dynamic method of measurement, the elastic modulus and elastic modulus-to-density ratio were explored in the range of room temperature to 750° F. (Q21, Ti)

846-Q. The Effect of Sulphur on the Properties of Titanium and Titanium Alloys. L. W. Berger, D. N. Williams and R. I. Jaffee. *American Society for Metals, Transactions,* v. 49, *Preprint No.* 12, 1956, 18 p.

Additions of up to 0.025 wt. % sulphur resulted in increased tensile strength and decreased ductility. Sulphur had no effect on beta-to-alpha transformation temperatures. Very small additions effectively refined the grain size. (Q23, M27, Ti)

847-Q. The Temperature Dependence of the Hardness of "Pure" Iron and Various Ferritic Steels. F. Garofalo, G. V. Smith, and D. C. Marsden. *American Society for Metals, Transactions,* v. 49, *Preprint No.* 15, 1956, 30 p.

The change of hardness with temperature was determined for various "pure" irons, low carbon commercial steels and chromium steels. (Q29, Fe, ST)

848-Q. The Influence of Bainite on Mechanical Properties. R. F. Hehemann, V. Luhanov and A. R. Troiano. *American Society for Metals, Transactions,* v. 49, *Preprint No.* 16, 1956, 23 p.

At a constant strength level, high-temperature bainite lowers yield strength, reduction in area and impact energy. A heat treatment involving the formation of small amounts of high-temperature bainite prior to quenching appears to be commercially feasible. (Q general, M27, AY)

849-Q. Creep and Stress Rupture Properties of Zirconium, Effect of Annealing Treatment. R. W. Guard and J. H. Keeler. *American Society for Metals, Transactions,* v. 49, *Preprint No.* 18, 1956, 18 p.

Significant creep does not occur at stresses below the yield strength at temperatures below 300° C. Effect of annealing treatment is significant only at 500° C. where the creep rupture stress of β annealed material is significantly larger than that of α annealed material. (Q3, Q4, J23, Zr)

850-Q. The Plastic Deformation of Uranium on Thermal Cycling. H. H. Chiswik. *American Society for Metals, Transactions,* v. 49, *Preprint No.* 21, 1956, 31 p.

The growth rates of uranium rods on thermal cycling are functions of both preferred orientation and grain size. Beta-treatment reduces the growth considerably but does not completely eliminate it. Room temperature thermal expansion coefficients are good qualitative guides in evaluating comparative growth behavior. (Q24, U)

851-Q. Impact Characteristics and Mechanical Properties of Leaded and Nonleaded C-1050 and C-1141 Steels. A. P. Weaver. *American Society for Metals, Transactions,* v. 49, *Preprint No.* 22, 1956, 17 p.

Tests show only slight differences in Brinell hardness and tensile properties, but Charpy "V" notch transition temperatures are consistently lower on the leaded steels than on the nonleaded steels. (Q6, Q general, CN, Pb)

852-Q. Relation of Inclusions to the Fatigue Properties of SAE4340 Steel. H. N. Cummings, F. B. Stulen and W. C. Schulte. *American Society for Metals, Transactions,* v. 49, *Preprint No.* 23, 1956, 36 p.

Fatigue test data. An explanation concerning the mechanism of fatigue. (Q7, AY)

853-Q. Effect of Silicon on Transverse Properties and on Retained Austenite

Content of High Strength Steels. John Vajda, John J. Hauser and Cyril Wells. *American Society for Metals, Transactions,* v. 49, *Preprint No.* 24, 1956, 34 p.

The effects of adding 1 and 1.5% silicon to an AISI 4340 steel on the transverse mechanical properties and retained austenite content of end-quenched 7 x 7-in. rounds in the as-quenched, as well as in the quenched and tempered condition, were determined. (Q general, N8, AY)

854-Q. Bend: Tensile Relationships for Toolsteels at High Strength Levels. John C. Hamaker, Jr., Vance C. Strang and George A. Roberts. *American Society for Metals, Transactions,* v. 49, *Preprint No.* 25, 1956, 30 p.

Two tungsten-chromium tool steels of medium and high carbon content were tested in tension and bending to establish preliminary conversion relationships between the two test methods. (Q5, Q27, TS)

855-Q. High Temperature Rupture-Strength Properties of Chromium-Nickel Stainless Steels Containing Titanium and Boron. J. Salvaggi and L. A. Yerkovich. *American Society for Metals, Transactions,* v. 49, *Preprint No.* 33, 1956, 19 p.

Titanium, boron and carbon are all capable of improving the 100-hr., 1500° F. rupture strength of 10 Cr—8 Ni and 17 Cr—12 Ni—2.5 Mo stainless steels heat treated in the range of 2100 to 2300° F. (Q4, SS)

856-Q. Effect of Environment on Creep-Rupture Properties of Some Commercial Alloys. Paul Shahinian. *American Society for Metals, Transactions,* v. 49, *Preprint No.* 34, 1956, 22 p.

The creep-rupture properties of the alloys, DM 45, 12% Cr-V steel, AISI 304, N-155, S-816, and Inconel X were determined in atmospheres of air, oxygen, nitrogen, helium and vacuum. (Q3, Q4, SG-h)

857-Q. The Mechanical Properties of Iron-Aluminum Alloys. W. Justusson, V. F. Zackay and E. R. Morgan. *American Society for Metals, Transactions,* v. 49, *Preprint No.* 36, 1956, 18 p.

Effect of processing variables such as melting and casting practices, hot working and heat treatment, and alloying elements on mechanical properties. (Q23, Fe, Al)

858-Q. The Mechanical Properties of Swaged Iodide-Base Chromium and Chromium Alloys. D. J. Maykuth and R. I. Jaffee. *American Society for Metals, Transactions,* v. 49, *Preprint No.* 38, 1956, 10 p.

Swaged iodide chromium with a fibrous structure and tested as a round bar shows excellent tensile ductility which is lost after the material has been recrystallized. Recrystallized chromium-base alloys with 50% iron or nickel, tested as bar stock, have excellent tensile ductility. (Q21, Q23, Cr)

859-Q. Effect of Dispersion of Alpha Phase on the High Temperature Fatigue Properties of Alpha-Beta Brass. J. E. Breen and Joseph R. Lane. *American Society for Metals, Transactions,* v. 49, *Preprint No.* 39, 1956, 24 p.

A comparison at elevated temperature, of the tensile-fatigue and stress-rupture properties of a two-phase alloy as modified by changes in dispersion. (Q7, Cu)

860-Q. (English.) **Characteristic Directions of Certain Equations of Plasticity.** J. L. Ericksen. *Mathematika,* v. 3, no. 5, June 1956, p. 56-62.

A partial solution of the basic mathematical problem involved in the theory of plasticity. (Q24)

861-Q. (Czech.) **Some Experiences With the Ascertainment of Internal Stress in Big Forgings of Steam Turbine Rotors.** Oldrich Kerkovsky and Oldrich Zebrak. *Hutnické Listy,* v. 11, no. 8, Aug. 1956, p. 472-477.

Stress is calculated from the diametric deformation of a ring cut from the rotor body. (Q25)

862-Q. (French.) **Modes of Deformation in Metals.** L. Habraken and T. Greday. *Revue Universelle des Mines,* v. 12, ser. 9, no. 99, Aug. 1956, p. 209-227.

Present knowledge about the deformation of metallic monocrystals and polycrystals. Theoretical interpretation in relation to the properties of dislocation. (Q24)

863-Q. (German.) **Testing of Nonalloyed Steels in Multi-Axis Stress Conditions by Means of Inner Pressure Tests.** Alfred Krisch. *Archiv für das Eisenhüttenwesen,* v. 27, no. 8, Aug. 1956, p. 531-537.

Tensile test with an additional inner pressure on hollow specimens of nonalloyed, rimmed and killed Thomas and Siemens-Martin Steels with 0.04 to 0.2% carbon, under normal annealed and artificially aged conditions. (Q27, CN)

864-Q. (Japanese.) **Measurement on Ratio of Elongation of Ferrite Grain.** Tetsutaro Mitsuhashi and Yuzo Hosoi. *Journal of Mechanical Laboratory (Japan),* v. 10, no. 4, July 1956, p. 132-135.

Two methods of measurement and results for aluminum-killed and rimmed Armco sheets. (Q23, Fe)

865-Q. (Russian.) **Effect of Local Plastic Deformation on the Strength of Steel.** A. E. Asnis. *Avtomaticheskaia Svarka,* v. 9, no. 3, May-June 1956, p. 88-94.

Effect of this type of deformation, caused by cutting and punching, on the static and vibrational strength of low carbon openhearth and converter steels. Types of fractures and breaks, including fibrous, crystalline and mixed.
(Q23, Q24, G2, G17, CN)

866-Q. (Russian.) **Effect of Local Plastic Deformation of the Edge of Sheets on the Strength of Lap-Welded Joints.** B. F. Lebedev. *Avtomaticheskaia Svarka,* v. 9, no. 3, May-June 1956, p. 95-101.

Results of static tests at low temperatures of joints, with forces along the seam, in the case where one seam is discontinuous and the edge of the metal has been cut on a shearing machine. Nature of tears on cut edge when metal is stretched. (Q23, G15, CN)

867-Q. (Russian.) **Effect of Alloying Elements on the Heat-Resistant Properties of Chromium Stainless Steels.** G. P. Fedortsov and M. F. Sheshenev. *Metallovedenie i Obrabotka Metallov,* no. 6, June 1956, p. 2-16.

Effect of vanadium, columbium, molybdenum and titanium on mechanical properties of chromium stainless steels at various temperatures. Their effect in relation to variations of heat treatment, including aging, and varying carbide content. Effect on creep and long-term strength. (Q general, SS-h)

868-Q. (Russian.) **Heat-Resistant Steels for Use at 550-600°.** L. Ia. Liberman and A. V. Boeva. *Metallovedenie i Obrabotka Metallov,* no. 6, June 1956, p. 16-25.

Microstructure, long-term creep strength, and other mechanical properties of steels in relation to variations in heat treatment.
(Q general, J general, M27, SS-h)

869-Q. (Russian.) **Effect of Cold Plastic Deformation on Irreversible and Reversible Temper Brittleness.** M. M. Shteinberg, V. D. Sadovskii and A. V. Demakova. *Metallovedenie i Obrabotka Metallov,* no. 6, June 1956, p. 26-35.

Effect of deformation on hardness and impact toughness in relation to tempering temperatures. Effect of heat treatment variations. (Q23, Q6, Q29, J29, CN)

870-Q. (Book.) **Residual Welding Stresses.** R. Gunnert. 135 p. 1955. Almqvist & Wiksell, Stockholm.

Method for measuring residual stresses and its application to a study of residual welding stresses. (Q25, K general)

871-Q. Effect of Temperature on Modulus of Elasticity of Porcelain Enameled Steel. R. E. Cowan, A. W. Allen and A. L. Friedberg. *American Ceramic Society, Journal,* v. 39, Sept. 1956, p. 293-300.

Equations and constants are presented by which the elastic constant can be calculated for any enamel thickness from room temperature to 500° C. Graphs show relationship of the modulus of elasticity, temperature and enamel-metal thickness ratio. (Q21, L27)

872-Q. Metallurgical and Mechanical Characteristics of High-Purity Titanium-Base Alloys. F. C. Holden, H. R. Ogden, and R. I. Jaffee. *Battelle Memorial Institute Quarterly Progress Report for Wright Air Development Center Contract No.* AF 33(616)-3469, May 1956, 7 p.

Mechanical properties of electrolytic titanium compared with those for iodide titanium. (Q general, Ti)

873-Q. Combined Stress Creep Fracture of a Commercial Copper at 250° C. A. E. Johnson, J. Henderson and V. D. Mathur. *Engineer,* v. 202, Aug. 24, 1956, p. 261-265; Aug. 31, 1956, p. 299-301.

All fractures under complex stress creep conditions, including pure tension and pure torsion, are overwhelmingly intercrystalline in nature. The period to creep fracture is purely a function of the maximum tensile principal stress.
(Q3, Q26, Cu)

874-Q. The Measurement of Fatigue Damage in Mild Steel. P. G. Forrest. *Engineering,* v. 182, Aug. 31, 1956, p. 266-268.

Unnotched and notched test pieces of mild steel tested in a direct-stress fatigue machine. (Q7, CN)

875-Q. The Reversible Bending of Turbine Shafts With Temperature. A. Barker and F. W. Jones. *Institution of Mechanical Engineers, Proceedings,* v. 169, no. 41, 1955, p. 853-859; disc., p. 860-863.

Bending is caused by expansion coefficient differences in the steel. This difference is a function of the heat treatment and can be cured by a second normalizing treatment, modifications of the expansion characteristics are associated with different carbide structures.
(Q5, P11, J24, CN)

876-Q. Time-Dependent Tangent Modulus Applied to Column Creep Buckling. R. L. Carlson. *Journal of Applied Mechanics,* v. 23, Sept. 1956, p. 390-394.

The relation of the time-dependent tangent-modulus load to actual column capacity is clarified. The time-dependent tangent-modulus load is an approximation to a conservative estimate. The approximation, however, may be either conservative or nonconservative when applied to imperfect or real columns. (Q3)

877-Q. Studies on Plastic Flow of Anisotropic Metals. L. W. Hu. *Journal of Applied Mechanics,* v. 23, Sept. 1956, p. 444-450.

Based on Hill's theory of plasticity for anisotropic metals, the plastic stress-strain-increment relations are derived for materials with strain hardening. The influence of anisotropy on the plastic behavior of metals in a state of plane strain or plane stress is discussed. (Q24)

878-Q. Wear Life of Aluminum Gears. A. H. Maschmeyer. *Product Engineering,* v. 27, Sept. 1956, p. 160-166.

Development of analytical procedure for estimating probable life of aluminum gears; modification of Hertz's theoretical equations to conform to actual test results; comparison of anodized and unanodized gears. (Q9, T7, Al)

879-Q. Photo Stress. F. Zandman and Marc R. Wood. *Product Engineering,* v. 27, Sept. 1956, p. 167-178.

New technique for observing and measuring surface strains on actual structures and parts, using a transparent plastic coating that becomes doubly refractive when stressed. Advantages and limitations of the method, selection of the plastic material, measuring birefringence, determining magnitude and direction of stress. (Q25)

880-Q. Notes on the Brittle Fracture of Steels. *Sulzer Technical Review,* v. 38, no. 1, 1956, p. 14-27.

Mechanism of fracture in the high and low ranges of notch impact values. Investigation of an I-girder destroyed by brittle fracture. (Q26, ST)

881-Q. Notch Toughness of Weld Deposits in Commercial Titanium Alloys. D. M. Daley, Jr., and C. E. Hartbower. *Welding Journal,* v. 35, Sept. 1956, p. 447S-456S.

While deposited weld metal of acceptable toughness can be obtained the heat-affected zones of the alloys studied leave much to be desired. (Q23, K1, Ti)

882-Q. Internal Notch Effect and Surface Sensitivity Under Cyclic Bending Stresses. IV. Processes Which Occur in Metals Under Tensile and Fatigue Stresses. Cord Petersen. *Henry Brutcher Translation No.* 3157, 15 p. (From *Zeitschrift für Metallkunde,* v. 43, no. 12, 1952, p. 429-433.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 296-Q, 1953. (Q5, ST, CI)

883-Q. Room Temperature Creep Tests on Steel Wire. A. Krisch. *Henry Brutcher Translation No.* 3361, 10 p. (From *Archiv für das Eisenhüttenwesen,* v. 22, nos. 9-10, 1951, p. 313-1955, p. 107-116.) Henry Brutcher, Al-316.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 102-Q, 1952. (Q3, ST)

884-Q. Effect of Columbium and Titanium on Properties of Stainless Steels. A. M. Samarin and A. A. Yaskevich. *Henry Brutcher Translation No.* 3772, 16 p. (From *Izvestiya Akademii Nauk SSSR, OTN,* no. 10, 1955, p. 107-116.) Henry Brutcher, Altadena, Calif.

Comparison of effects of titanium and columbium on mechanical properties, particularly ductility, of 18-8 steels. Effects of titanium and columbium on resistance to intergranular corrosion. Comparative weldability and resistance of welds to corrosion. (Q23, R2, K9, Cb, Ti, SS)

885-Q. Sulfidizing of Chromium Stainless Steels. E. P. Pukhovskii, P. A. Sakharova, N. A. Shigunova and G. P. Budaev. *Henry Brutcher Translation No.* 3799, 6 p. (From *Metallovedenie i Obrabotka Metallov,* v. 2, no. 5, 1956, p. 40-43.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 681-Q, 1956. (Q9, L15, ST, SS)

886-Q. Residual Stresses in Castings. A. Portevin and J. Pomey. *Institute of British Foundrymen,* v. 48, p. 60A-69A; disc., p. 69A-72A.

Detection, classification and measurement of stresses; effects of residual stresses; surface hardening and prestressing; stresses in relation to castings. (Q25)

887-Q. Influence of Grain Size on the Structure, Pressure-Tightness and Tensile Properties of Sand-Cast Bronzes and Gunmetals. A. Cibula. *Institute of British Foundrymen,* v. 48, p. 73A-86A; disc., p. 86A-90A.

Intergranular films of tin-rich eutectoid were more pronounced in grain-refined castings. Because of their unfavorable distribution of porosity, grain-refined castings had much poorer pressure-tightness and, generally, poorer mechanical properties. (Q23, M27, Cu)

888-Q. (English.) **Easy Glide of Cubic Metal Crystals.** J. Garstone, R. W. K. Honeycombe and G. Greetham. *Acta Metallurgica,* v. 4, no. 5, Sept. 1956, p. 485-494.

Examination of aluminum and copper crystals shows that length of easy-glide range varies because of existence of a size factor, demonstrated by experiments on crystals of identical orientation, but of different sizes. (Q24, M26, Cu, Al)

889-Q. (English.) **Elastic and Plastic Behavior of the Ferrite Lattice in a Low-Alloy Steel.** H. C. Vacher, R. Liss and R. W. Mebs. *Acta Metallurgica,* v. 4, no. 5, Sept. 1956, p. 532-540.

Lattice-strain measurements by the X-ray back-reflection method were made in 17 directions with the specimen in the loaded and unloaded conditions. Analysis of the lattice compliances indicated that a transverse compression stress and a shear stress were superposed on the axial stress. (Q21, Q23, M26, AY)

890-Q. (German.) **Yield and Breaking Stresses for Multi-Axis Loads.** K. Matthaes. *Metall,* v. 10, no. 17-18, Sept. 1956, p. 795-800.

Effect of multi-axis loads on yield and breaking stress of marble, porcelain, cast iron, white metal, copper, aluminum alloys and steel. (Q23, CI, Cu, Al, St, Sn)

891-Q. (German.) **Examination of Breakdown of Welded Components.** W. Marfels. *Schweissen und Schneiden,* v. 8, no. 8, Aug. 1956, p. 269-277.

Examination and interpretation of weld breakdowns as to fibrous fracture, brittle fracture, fatigue fracture and source of fracture. (Q26, AY)

892-Q. (German.) **Contribution to the Problem of Shear Strength in Soldered Joints.** Helmut Koch and Walter Pänitz. *Schweissen und Schneiden,* v. 8, no. 8, Aug. 1956, p. 288-292.

The shear test seems to be more indicative than the tensile test. A comparison of this work with published data shows a possibility of good discrimination using a shear test. (Q2, K9)

893-Q. (German.) **Heat Treatment of Structural Steels to Increase the Strength of Component Parts of Structures.** H. Staudinger. *Schweizer Archiv für Angewandte Wissenschaft und Technik,* v. 22, no. 8, Aug. 1956, p. 244-257.

Survey shows that oriented internal stresses improve the endurance limit, and strength is materially improved when surface hardening is carried through. (Q23, Q7, J26, ST)

894-Q. (German.) **The Industrial Titanium Alloy TiAl6V4, Its Properties and Thermal Treatment.** Willy Knorr. *Zeitschrift für Metallkunde,* v. 47, no. 8, Aug. 1956, p. 548-557.

Modifications of tensile strength, yield strength, elongation, notch-impact strength and hardness which may be obtained by heat treatment. (Q23, Q29, J26, Ti)

895-Q. (German.) **Damping Phenomenon of Hydrogen Impregnated Titanium.** Werner Köster, Lothar Bangert and Manfred Evers. *Zeitschrift für Metallkunde,* v. 47, no. 8, Aug. 1956, p. 564-570.

Hydrogen-loaded titanium samples show two maximum points of attenuation which are attributed to dissolution of hydride during heating and precipitation of hydride during cooling. (Q8, Ti)

896-Q. (German.) **Effect of Hydrogen in Titanium Alloys.** Hans-Walter Schleicher and Ulrich Zwicker. *Zeitschrift für Metallkunde,* v. 47, no. 8, Aug. 1956, p. 570-576.

Effect of hydrogen content, heat treatment and preloading on breaking load and creep strength. (Q3, Q23, J general, Ti)

897-Q. (Russian.) **The Structure of Slip Lines on Deformed Aluminum Alloys.** N. N. Buinov. *Fizika Metallov i Metallovedenie,* v. 2, no. 3, 1956, p. 477-483.

An electron-microscopic study of slip lines on the surface of aluminum-copper, aluminum-silicon and aluminum-magnesium-silicon alloys. Deformation in alloys is found to be localized, not only along the slip lines but also between them. (Q24, M21, Al)

898-Q. (Russian.) **Internal Friction in Plastically Deformed Copper and Aluminum.** V. S. Postnikov and M. M. Beliaev. *Fizika Metallov i Metallovedenie,* v. 2, no. 3, 1956, p. 504-508.

Study of the variation of internal friction in pure copper and pure aluminum with temperature and time of isothermal exposure. An analysis of the relationship suggests

that processes of recovery, rather than of recrystallization, account for the change in internal friction. (Q22, Q24, N4, Al, Cu)

899-Q. (Russian.) **The Mechanism of Flake Formation in Steel.** V. S. Meskin. *Stal',* v. 16, no. 8, Aug. 1956, p. 727-734.

Shows that flakes are localized, dynamic ruptures caused by the sudden release of energy created by the formation of molecular hydrogen from atomic hydrogen. (Q23, Q26, ST)

900-Q. (Russian.) **The Mechanism of Flake Formation.** V. F. Loshkarev. *Stal',* v. 16, no. 8, Aug. 1956, p. 734-737.

The primary factor in flake formation is hydrogen in solution in the metal. However, the hydrogen hypothesis is inadequate for explaining some of the peculiarities of flake formation in various steels. (Q23, Q26, ST)

901-Q. (Russian.) **The Effects of Cold Straightening on the Dynamic Strength of Resistance Welded Components.** V. B. Shliapin. *Svarochnoe Proizvodstvo,* no. 8, Aug. 1956, p. 7-10.

Tests show that it is possible to cold-straighten resistance welded, medium-carbon steel articles just as easily as one can straighten the base metal. (Q23, F29, CN)

902-Q. (Russian.) **Detecting Primary Stress in Hard Alloys by X-Ray Structure Study.** R. A. Landa. *Zavodskaia Laboratoriia,* v. 22, no. 7, July 1956, p. 821-823.

May be used for measuring great stresses resulting from various processes in working the metal. The stresses may exceed 100 kg. per sq.mm. Apparatus and method of carrying out the measurements. (Q25, SG-j)

903-Q. (Russian.) **A Third Period of Stress Relaxation in Metals.** V. Z. Tseitlin. *Zavodskaia Laboratoriia,* v. 22, no. 7, July 1956, p. 845-849.

Refutes earlier theory that there may be three periods of stress relaxation. The third period in the process was characterized by an increase in the speed of the process to end with the complete softening of the metal. (Q25, J1)

904-Q. (Russian.) **Evaluating the Susceptibility of Steel to Temper and Thermal Brittleness.** P. B. Mikhailov-Mikheev. *Zavodskaia Laboratoriia,* v. 22, no. 7, July 1956, p. 849-853.

Discussion and criticism of the usual tests. Suggestions for improving the tests. (Q23, ST)

905-Q. Strengths and Failure Characteristics of AMS 5534A (S-816) Alloy in Direct Tensile Fatigue at Elevated Temperatures. Charles A. Hoffman. *American Society for Testing Materials, Preprint no.* 68, 1956, 18 p.

Relations between superimposed cyclic stress, mean stress, temperature, time to failure and failure characteristics of wrought S-816 alloy. (Q23, Q7, SG-h, Co)

906-Q. Effects of a Number of Heat Treating and Testing Variables on the Notch Strength of 4340 Steel. G. Sachs, V. Weiss and E. P. Klier. *American Society for Testing Materials, Preprint no.* 71, 1956, 11 p.

Steel tends to be highly notch sensitive on static loading, if tempered at temperatures between 500 and 700° F. A two-step quenching procedure leads to high-strength steel conditions that are superior to those obtained by conventional methods. (Q23, J26, J29, AY)

907-Q. An Empirical Relationship Between Rupture Life and Minimum Creep Rate in Creep-Rupture Tests. Forest C. Monkman and Nicholas J. Grant. *American Society for Testing Materials, Preprint no.* 72, 1956, 13 p.

Such variables as testing stress, temperature, composition and total ductility were investigated for their effects on the empirical relationship determined for a wide range of alloys based on aluminum, iron, nickel, titanium, cobalt and copper. (Q3, Q4, Al, Fe, Ni, Ti, Co, Cu)

908-Q. The Effects of Strain Rate and Temperature on the Stress-Strain Relations of Deep-Drawing Steel. R. J. MacDonald, R. L. Carlson and W. T. Lankford. *American Society for Testing Materials, Preprint no.* 73, 1956, 17 p.

The yield point phenomena and work-hardening characteristics of fully aluminum-killed temper-rolled steel can be markedly affected by variations in both strain rate and temperature. Reference is made to dislocation theory and to velocity-modified temperature relations. (Q27, CN)

909-Q. The Strength of Certain Stainless and Carbon Steels at Low Temperatures. S. C. Collins, F. D. Ezekiel, O. W. Sepp and J. W. Rizika. *American Society for Testing Materials, Preprint no.* 74, 1956, 13 p.

Torsion and tension tests, effect of work hardening. Unusual discontinuities in the stress-strain relationship of stainless steel at the lower temperatures were observed. (Q27, Q1, CN, SS)

910-Q. Effect of Composition and Heat Treatment on Impact Properties of AISI Type 403 and 410 Stainless Steel. E. J. Whittenberger, E. R. Rosenow and D. J. Carney. *American Society for Testing Materials, Preprint no.* 75, 1956, 19 p.

Use of higher carbon contents, addition of nitride and carbide forming elements, and austenitizing at lower temperatures to achieve finer grain size and minimize intergranular carbide precipitation during subsequent tempering improve impact properties. (Q6, J general, SS)

911-Q. The Effect of Creep Stress History at High Temperatures on the Creep of Aluminum Alloys. O. D. Sherby, T. A. Trozera and J. E. Dorn. *American Society for Testing Materials, Preprint no.* 77, 1956, 16 p.

Initial plastic straining upon application of a constant stress decreases creep resistance, whereas straining during creep increases creep resistance. High-temperature creep at low stresses obeys a mechanical equation of state. (Q3, Al)

912-Q. The Effect of Static Mean Stress on the Damping Properties of Materials. Neal L. Person and Benjamin J. Lazan. *American Society for Testing Materials, Preprint no.* 85, 1956, 15 p.

Effect is small for materials with little magnet-mechanical effect, but greatly reduces the damping of Type 403 alloy which has considerable magneto-mechanical damping. (Q8, Q25, SS)

913-Q. Improved Elevated Temperature Strength. R. A. Lula, A. J. Lena and H. M. Johnson. *Chemical Engineering,* v. 63, Oct. 1956, p. 236 + 3 p.

Cold working can increase the rupture strength of types 301, 305 and 310 stainless steels, providing the degree of cold work and conditions of exposure are not conducive to extensive recrystallization. (Q23, N5, SS)

914-Q. Hot-Tearing—A Review Prepared by IBF Technical Sub-Committee T.S. 32. *Foundry Trade Journal,* v. 101, Sept. 13, 1956, p. 297-299.

A short summary of experimental work and knowledge gained in the past ten years. (Q23, E general, Mg, Al, Cu, CI)

915-Q. The Cleavage Fracture of Copper-Plated Zinc Single Crystals. G. B. Greenough and D. A. Ryder. *Institute of Metals, Journal,* v. 84, Aug. 1956, p. 467-470.

Effect of an electrodeposited layer of copper on the tensile stress. Plastic deformation before fracture was much less in electroplated crystals than in the unplated. (Q23, Q26, Q27, Cu, Zn)

916-Q. Radiation Damage to Metals and Associated Problems. M. J. Makin. *Institute of Metals, Journal,* v. 84. *Institute of Metals Bulletin,* v. 3, Aug. 1956, p. 101-103.

Effect of neutron irradiation on the mechanical properties of metals. (Q general, P10)

917-Q. Surface Film Formation and Metallic Wear. W. Hirst and J. K. Lancaster. *Journal of Applied Physics,* v. 27, Sept. 1956, p. 1057-1065.

When a relatively soft metal slides on a harder one, the relationship between wear and sliding distance may be one of three general types, each associated with the formation of a surface film during sliding. These films influence the relationship between wear rate and applied load. (Q9)

918-Q. Effect of Strain Rate on the Propagation of a Plastic Strain Pulse Along a Lead Bar. B. E. K. Alter and C. W. Curtis. *Journal of Applied Physics,* v. 27, Sept. 1956, p. 1079-1085.

A strain-rate effect plays an important part in controlling the behavior of a plastic strain pulse. (Q24, Q25, Pb)

919-Q. Cold Worked 301 Stainless—Still Strong at 800° F. R. A. Lula. *Materials & Methods,* v. 44, Sept. 1956, p. 100-102.

Looks promising for use at moderately elevated temperatures because of its excellent creep and rupture properties, good structural stability, low alloy index and ready availability. (Q3, Q4, SS)

920-Q. How 7 Nonferrous Metals Perform at Low Temperatures. T. Gela, W. J. Lepkowski and H. M. Gade. *Materials & Methods,* v. 44, Sept. 1956, p. 116-120.

Tensile, fatigue and impact properties of beryllium copper, phosphor bronze, silver solder, molybdenum, tungsten, tantalum and Nilvar. (Q23, Q7, Q6, Cu, Ag, Mo, W, Fe)

921-Q. Some Experiments in the Lubrication of Stainless Steels. II. Friction Tests. G. D. Jordan. *Scientific Lubrication,* v. 8, Sept. 1956, p. 13-16, 18.

Apparatus, procedures and results of tests assessing heat and wear produced by friction. (Q9, SS)

922-Q. The Metallographic View. XXVI. Hardness of Micro-Constituents In Steels. H. E. Boyer. *Steel Processing,* v. 42, Sept. 1956, p. 516, 534.

Illustrates wide variation in hardness value which exists in the carburized case of a simple carbon steel. (Q29, M27, CN)

923-Q. (French.) **Photo-Elastic Measuring of Elastic and Plastic Deformation and Crystalline Fragmentations in Metals.** F. Zandman. *Revue de Métallurgie,* v. 53, no. 8, Aug. 1956, p. 628-644.

Permits a complete photo-elastic analysis of the actual pieces, whatever their shape, size of material, by covering the specimen with a special photo-elastic layer (liquid form or sheet) which becomes birefringent by the effect of the deformations. (Q25)

924-Q. (French.) **Comparative Study of Experimental Taps of Extra-Mild Rimmed Openhearth and BTM Basic Bessemer Steels. I. Mechancal Properties.** R. Borione, F. Maratray and Y. Morillon. **II. Weldability Tests. Discussion and Conclusion.** H. Granjon and J. P. Videau. *Soudage et Techniques Connexes,* v. 10, no. 718, July-Aug, 1956, p. 191-204.

Experiments performed on sheet, including determination of ductile transition temperature in crude and aged states. Both steels have about the same sensitiveness to cutting. Because of the carbon content, temperature of transition is lower in openhearth than in basic bessemer steels. (Q23, D2, D3, K9, CN)

925-Q. (French—German.) **Influence of Grain Thickness on Metal Properties of Metals and Alloys.** K. Camenisch. *Pro-Metal,* v. 9, no. 52, Aug. 1956, p. 698-706.

Determination of grain thickness by comparative and numerical methods. Mechanical properties. Influence of plastic deformation and annealing. Surfaces and cold working plasticity. Choice of right grain thickness. (Q24, J23, M27)

926-Q. (German.) **On the Wear of Cast-Iron Cylinder Liners.** Paul A. Heller and Wolfgang Glaser. *Giesserei,* v. 43, no. 18, Aug. 30, 1956, p. 505-507.

A review of the literature and recent experimental results. (Q9, CI)

927-Q. (German.) **Impact Strength and the Appearance of the Fracture in Notched Charpy Specimens of Normalized Plates of Unalloyed Fine-Grained Steel With an Approximate 0.15% Carbon Content.** Heinz Kornfeld. *Stahl und Eisen,* v. 76, no. 18, Sept. 5, 1956, p. 1173-1178.

Relation between impact strength and appearance of the fracture in the temperature range of +20 to −60° C. (Q26, Q6, ST)

928-Q. (Russian.) **Laboratory Evaluation of the Wear Resistance of Steels by Abrasion With Sandpaper.** M. M. Tenenbaum. *Vestnik Mashinostroeniia,* v. 36, no. 8, Aug. 1956, p. 25-30.

Testing wear resistance of various steels by comparing their wear with that of a control sample. (Q9, ST)

929-Q. (Russian.) **Method of Evaluating the Tendency of Materials to Delayed Failure.** T. K. Zilova, N. I. Demina and Ia. B. Fridman. *Zavodskaia Laboratoriia,* v. 22, no. 8, Aug. 1956, p. 967-972.

Study of the energy relationships giving rise to delayed failure. Presents a laboratory method of testing at low temperatures. (Q26, S21)

930-Q. (Swedish.) **Plastic Deformation of Metals.** Ake Hentz. *Jernkontorets Annaler,* v. 140, no. 8, 1956, p. 575-602.

Structural and crystallographic features of deformation, considering conditions in pure metals at room temperature and normal strain rates under simple stress situations. Slip in single metal crystals and polycrystalline metals; reorientation from slip; twinning. (Q24)

931-Q. Experiments on the Effect of Rate of Testing on the Criterion of Failure of Certain Mild Steels When Subject to Dynamic Torsion and Static Tensile Stresses. N. G. Calvert. *Institution of Mechanical Engineers, Proceedings,* v. 169, no. 44, 1955, p. 903-907; disc., p. 907-909.

Torsional impact tests were made on a range of mild steel specimens subjected in addition to various intensities of axial tensile stress. (Q1, Q6, Q27, CN)

932-Q. The Effect of Impurities on the Properties of Pure Iron. J. D. Fast. *Metallurgia,* v. 54, no. 323, Sept. 1956, p. 123-127. (From *Stahl und Eisen,* v. 73, p. 1484-1496.)

Investigation was made using very high purity iron, with and without the addition of known amounts of various impurities, particularly carbon and nitrogen. (Q general, Fe)

933-Q. A Rapid Method of Estimating the Fatigue Limit or Endurance Limit of Metals in Reverse Bending. J. McKeown. *Metallurgia,* v. 54, no. 323, Sept. 1956, p. 151-156, 158.

Develops rapid method for investigating material using a progressive loading technique. (Q7, Cu, AY, Pb, Al)

934-Q. Mechanical Properties in Relation to Design Requirements. C. Richard Soderberg. *Metallurgical Reviews,* v. 1, pt. 1, 1956, p. 31-63 + 4 plates.

Reviews philosophy of modern design and dependence on mechanical failure tests where service reliability is approaching previously unheard-of standards. (Q23)

935-Q. Development of Nickel-Chromium Base Alloys for High-Temperature Service. I. Composition and Heat Treatment. W. Betteridge and A. W. Franklin. *Metal Treatment and Drop Forging,* v. 23, Sept. 1956, p. 343-348.

Effect of composition and of heat treatment on creep and stress-rupture properties. (To be continued.) (Q3, Q4, J26, SG-h, Cr, Ni)

936-Q. Physical and Metallurgical Aspects of Creep. II. Metallurgical Considerations. L. A. Phelps. *Metal Treatment and Drop Forging,* v. 23, Sept. 1956, p. 349-352.

Mechanism of deformation considered in terms of various dislocation theories. (Q3, M26)

937-Q. Internal Friction Methods Applied to Metallurgical Problems. I. Theory of Internal Friction Technique. W. R. Thomas and G. M. Leak. *Metal Treatment and Drop Forging,* v. 23, Sept. 1956, p. 359-366.

The elastic after-effect, the torsion pendulum, experimental requirements and techniques, electromagnetic and quartz crystal techniques. (To be continued.) (Q22)

938-Q. Wear Behavior of High Temperature Bearing Materials. John T. Burwell. *Precision Metal Molding,* v. 14, Oct. 1956, p. 40 + 5 pages.

Two-phase material with nickel or nickel alloy base prepared by powder metallurgy and infiltered with silver or silver alloy, provides most effective combination. (Q9, H16, Ni, Ag)

939-Q. (English.) **Determination of the Yield Point of Steels by Magnetization.** P. Reti. *Acta Technica Academiae Scientiarum Hungaricae,* v. 15, no. 3-4, 1956, p. 347-359.

The yield points of structural steels compared to those of standard steels by using a perameter from which it is possible to derive unequivocal values of the yield point from a diagram. (Q23, P16, ST)

940-Q. (English.) **Determination of Elastic Constants of Metals and Alloys by Temperature Diffuse Scattering of X-Rays.** Shoichi Annaka. *Physical Society of Japan, Journal,* v. 11, no. 9, Sept. 1956, p. 937-943.

New method for determining elastic constants of cubic crystals was developed. Silver, copper-zinc and silver-copper alloys were used. (Q21, M22, Zn, Cu, Ag)

941-Q. (English and South African Dutch.) *Code of Practice for Methods for Impact Testing of Metallic Materials. South African Bureau of Standards,* O56-1955, Apr. 1955, 27 p.

Standardized test procedures to which reference can be made in specifications and in general test work. Tolerances on the dimensions of test specimens, in conjunction with the salient features of testing machines, are given. (Q6)

942-Q. (Czech.) **Stresses in Small and Medium-Sized Ingot Molds.** Josef Pribyl and Zdenek Kosnovsky. *Hutnik,* v. 6, no. 8, Aug. 1956, p. 239-243.

Study of stress effects on the mold and of shape and handling of mold on its life. Suggestions in selection of mold metal. (Q25, D9, ST)

943-Q. Hot-Tearing of Castings: A Review of the Literature. R. A. Dodd. *Foundry Trade Journal,* v. 101, Sept. 20, 1956, p. 321-331.

Occurrence, classification and identification, theories, temperatures, aluminum alloys, ferrous alloys, effect of composition, factors affecting incidence of tearing, methods of assessing susceptibility. (Q23, E general, Mg, CI, Al)

944-Q. Impact Torsion Experiments. N. G. Calvert. *Institution of Mechanical Engineers, Proceedings,* v. 169, no. 44, 1955, p. 897-902 + 2 plates.

Series of experiments, at speeds of 4 radians per sec. and less, to explore the region between static and impact conditions. Results on mild steels show that both upper and lower yield points increase progressively with the rate of straining. (Q1, Q6, ST)

945-Q. (Book.) **The Embrittlement of Metals.** B. R. Queneau. 90 p. 1956. American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. $3.00.

A series of four educational lectures covering the entire field of embrittling phenomena in metals, including behavior of metals under multi-axial stresses, blue brittleness, temper brittleness, 885-F and sigma-phase embrittlement of stainless steels. Covers temper brittleness in low and medium carbon alloy steels, tempered martensite brittleness in hardened steels, and embrittlement in stainless steels. (Q23, CN, AY, SS)

946-Q. (Book.) Resistance of Materials —Laboratory Manual. 3rd Ed. 109 p. 1955. Department of Theoretical and Applied Mechanics, University of Illinois, Urbana, Ill.

A laboratory course aimed at promoting a practical understanding of the mechanical properties of commonly used materials of engineering and their relation to the design, manufacture, and use of load-resisting members. Materials include aluminum alloys, brass, cast iron, concrete, lead alloys, steel, and wood. (Q general)

947-Q. Turbine Disks for Jet Propulsion Units. III. Blade Root Fixing of Turbine Disks for Jet Engine Units. A. E. Johnson. *Aircraft Engineering,* v. 28, Oct. 1956, p. 348-356.

Results and implications of creep tests on blade root fastenings using composite specimens of disk and blade materials, reproducing the form and dimensions of blade root fastenings used in practice. (Q3, K13)

948-Q. Validity of Time-Compensated Temperature Parameters for Correlating Creep and Creep-Rupture Data. F. Garofalo, G. V. Smith and B. W. Royle. *ASME, Transactions,* v. 78, Oct. 1956, p. 1423-1434.

A so-called master "curve" is discussed in terms of experimentally determined relationships. The parameters are not single-valued functions of the initial stress over wide ranges in stress. (Q3, ST)

949-Q. Mechanical Properties at Elevated Temperatures of Ductile Cast Iron. F. B. Foley. *ASME, Transactions,* v. 78, Oct. 1956, p. 1435-1438.

Demonstrates the application of the Larson-Miller method. Properties of ferritic ductile cast iron for 100° intervals from 700 to 1200° F. are summarized. (Q general, CI)

950-Q. Effect of Range of Stress in Combined Bending and Torsion Fatigue Tests of 25S-T6 Aluminum Alloy. W. N. Findley, W. I. Mitchell and D. D. Strohbeck. *ASME, Transactions,* v. 78, Oct. 1956, p. 1481-1487.

Effect of stress relaxation at high mean stresses was investigated. Applicability of several theories of failure are compared with test data. Influence of anisotropy, mechanism of crack formation, mean stress, and maximum stress. (Q5, Q1, Q7, Al)

951-Q. The Influence of Shank Area on the Tensile Impact Strength of Bolts. John Love, Jr., and O. A. Pringle. *ASME, Transactions,* v. 78, Oct. 1956, p. 1489-1496.

Effect of reduction of shank cross-sectional area of steel bolts investigated experimentally. (Q6, Q27, T7, ST)

952-Q. Report of the Investigation of the Turbine Wheel Fracture at Tanners Creek. A. W. Rankin and B. R. Seguin. *ASME, Transactions,* v. 78, Oct. 1956, p. 1527-1546.

Major parts of the investigation to determine cause of this fracture, together with the general conclusions. (Q26)

953-Q. Investigation of Large Steam-Turbine Spindle Failure. H. D. Emmert. *ASME, Transactions,* v. 78, Oct. 1956, p. 1547-1565.

Investigation of the design, metallurgy and manufacture of the spindle and of the operational history of the Ridgeland turbine showed that initiating cause of accident was flakes or thermal cracks developed in the shaft during heat treatment. (Q26, J general)

954-Q. Report of the Investigation of Two Generator Rotor Fractures. C. Schabtach, E. L. Fogleman, A. W. Rankin and D. H. Winne. *ASME, Transactions,* v. 78, Oct. 1956, p. 1567-1584.

Various phases of the investigation, which included a thorough study of features of design and manufacture and the characteristics of the rotor materials, together with a presentation of the results. (Q26)

955-Q. The Strength of Manholes in Welded Storage Tanks. P. H. R. Lane and A. A. Wells. *British Welding Journal,* v. 3, Sept. 1956, p. 414-425.

Tests carried out both on full-size manhole openings and on quarter-scale models. (Q23, K1)

956-Q. Effect of Impurities on the Hardness of Titanium. T. D. McKinley. *Electrochemical Society, Journal,* v. 103, Oct. 1956, p. 561-567.

Data presented allow the estimation of oxygen in unalloyed titanium from a hardness measurement and a few conventional chemical analyses. (Q29, Sn, Cu, Ni, Ti, Co)

957-Q. The Value of the Notch Tensile Test. J. F. Baker and C. F. Tipper. *Institution of Mechanical Engineers, Proceedings,* v. 170, no. 1, 1956, p. 65-75 + 2 plates; disc., p. 76-93.

Investigations indicate that test can reliably predict service performance. Test-piece is easily prepared, can be tested in any tensile testing machine and gives all the information necessary for assessing notch ductility. (Q27)

958-Q. What Do We Know About Hydrogen in Steel? II. C. R. Simcoe. *Iron Age,* v. 178, Oct. 11, 1956, p. 102-105.

The influence of hydrogen content, testing temperature and strength level studied in a 3% chromium, 0.44% molybdenum and 0.25% carbon steel. Embrittlement increased with hydrogen content over the range of 1 to 8 ppm. at all testing temperatures.
(Q general, J1, Mo, Cr, CN)

959-Q. Hypo-Elasticity and Plasticity. II. A. E. Green. *Journal of Rational Mechanics and Analysis,* v. 5, Sept. 1956, p. 725-734.

Derived equations suitable for plastic flow of compressible work-hardening body. Plastic flow of compressible bodies with zero work-hardening discussed. (Q24)

960-Q. What You Should Know About Hydrogen in Titanium. D. N. Williams and R. I. Jaffee. *Materials & Methods,* v. 44, Oct. 1956, p. 96-97.

In certain alloys as little as 200 ppm. of hydrogen induces strain-rate sensitivity, causes lower notch toughness and increases thermal instability. (Q23, Ti)

961-Q. High Strength Nickel-Base Alloy for High-Temperature Service. *Materials & Methods,* v. 44, Oct. 1956, p. 147-148.

Tensile strength at room temperature is about 167,000 psi. and a yield strength of 100,000 psi., while strength and ductility remain relatively high up to 1800° F. (Q23, Ni)

962-Q. How Copper Alloys Behave at High Temperatures. *Materials & Methods,* v. 44, Oct. 1956, p. 181-182, 184. (Translated from *Metallovedenie i Obrabotka Metallov,* 1955, no. 3, Sept. 1955, p. 32-38.)

Elevated-temperature properties of a number of Russian copper-base materials. (Q general, Cu, Ni)

963-Q. A Laboratory for the High-Temperature Creep Testing of Metals and Alloys in Controlled Environments. D. A. Douglas and W. D. Manly. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission),* ORNL-2053, Oct. 1956, 29 p.

Gaseous and vacuum testing machines, specimen design, operational problems, liquid-metal testing equipment, tube burst testing apparatus. (Q3)

964-Q. Impact Behavior of Thorium. J. A. Milko. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission),* ORNL-2122, Sept. 1956, 15 p.

Pure thorium behaves as a ductile material even at subzero temperatures. Addition of carbon results in presence of a transition temperature. Bomb-reduced thorium exhibits a ductile to brittle transition temperature. (Q6, Th)

965-Q. Metals at Elevated Temperatures. R. W. Guard. *Product Engineering,* v. 27, Oct. 1956, p. 160-164.

Hot and cold behavior of metals compared using homologous temperature scale, fatigue versus rupture stress as design criterion, predicting long-term properties from short-term tests. (Q general, P11)

966-Q. Static Strength of Aluminum-Alloy Specimens Containing Fatigue Cracks. Arthur J. McEvily, Jr., Walter Illg and Herbert F. Hardrath. *U. S. National Advisory Committee for Aeronautics, Technical Note* 3816, Oct. 1956, 54 p.

Seven specimens made of 2024 and 7075 alloys were subjected to repeated axial loads until cracks were formed. Method of analysis which predicts the observed results is described. (Q23, Q7, Al)

967-Q. (English.) **The Density, Magnetic Properties, Young's Modulus, and Δ E-Effect, and Their Change Due to Quenching in Ferromagnetic Iron-Aluminium Alloys. II. Young's Modulus and the Δ E-Effect.** Mikio Yamamoto and Satoshi Taniguchi. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 8, no. 3, June 1956, p. 193-204.

Measurements were made with the method of magnetostrictive vibration. (Q21, P10, P16, Fe, Al)

968-Q. (French.) **Influence of Hydrogen in Steels.** A. Kohn. *Metallurgie et la Construction Mécanique,* v. 88, no. 9, Sept. 1956, p. 717, 719-721.

A study of flakes and brittleness due to hydrogen in steels; remedies. (Q23, ST)

969-Q. (French.) **Behavior of Metallic Materials Under Complex Strains.** P. Laurent. *Metaux, Corrosion-Industries,* v. 31, no. 373, Sept. 1956, p. 355-368.

Study of metal fracture in machine parts in relation to metal properties. Various strain tests were considered and factors indicated for the choice of safety margins.
(Q25, Q26)

970-Q. (French.) **Factors of Brittleness in Structural Steels.** P. E. Lagasse. *Revue de la Soudure (Brussels),* v. 12, no. 3, 1956, p. 178-196.

Study of the structural alterations causing "transitions" in steels, in relation to the modern theories of for-

mation and propagation of microfissures; some resulting principles in estimating steel brittleness. Transition curves of various tests performed on a series of steels, weldability of these steels.
(Q23, N8, K9, ST)

971-Q. (German.) **Deformability of Sintered Iron.** P. Fischer and A. Steinegger. *Schweizer Archiv für Angewandte Wissenschaft und technik,* v. 22, no. 9, Sept. 1956, p. 290-293.

Effect of porosity of a powdered iron compact on its physical properties. (Q24, H14, Fe)

972-Q. (German.) **Investigation of Vibration Properties of Metals in an Ultrasonic Region at Higher Temperatures.** Hugo Josef Seemann and Herbert Staats. *Zeitschrift für Metallkunde,* v. 47, no. 9, Sept. 1956, p. 637-643.

A measuring arrangement which excites electrodynamically the fundamental axial vibration mode of cylindrical specimens. Natural frequency and damping capacity can be measured up to 1000° C. Results for duralumin, sintered aluminum, chromium-nickel-steels and a creep resistant chromium-nickel alloy.
(Q8, Al, SS)

973-Q. (Russian.) **Brittle Fracture of Soldered "1 x 13" Steel.** I. A. Zaks, S. K. Zvegintsev and R. N. Il'ina. *Energomaschinostroenie,* 1956, no. 9, Sept. 1956, p. 15-19.

Detection of cracks in turbine blades, effect of metal components and soldering and heat treatment temperatures on joint strength.
(Q26, K7, ST)

974-Q. (Russian.) **Analysis of Second-Order Stresses of the Alpha Phase of Quenched and Tempered Steel.** L. I. Lysak. *Izvestiia Akademii Nauk SSSR, Seriia Fizicheskaia,* v. 20, no. 6, June 1956, p. 624-630.

Experimental determinations show distortions to be the total effect of quench distortions, coherent distortions and dispersion distortions.
(Q25, J26, AY)

975-Q. (Russian.) **X-Ray Study of Residual Stresses in Electrolytic Deposits of Nickel.** V. P. Moiseev and O. S. Popova. *Izvestiia Akademii Nauk SSSR, Seriia Fizicheskaia,* v. 20, no. 6, June 1956, p. 641-645 + 1 plate.

Orientation of stresses in the deposits, stress removal, lattice distortions and relation of hydrogen content. (Q25, M22, Ni)

976-Q. (Russian.) **Residual Change of Interfacial Distances in Polycrystalline Specimens After Plastic Deformation.** D. M. Vasilev and A. F. Erashov. *Izvestiia Akademii Nauk SSSR, Seriia Fizicheskaia,* v. 20, no. 6, June 1956, p. 659-663.

This residual change is revealed in soft steel both in the case of very small plastic deformations as well as after the application of a load not exceeding the macroscopic limit of elasticity. (Q24, M26, CN)

977-Q. (Russian.) **X-Ray Study of the Plastic Deformation of Metals During Static and Dynamic Compression.** T. N. Smirnova and Iu. S. Terminasov. *Izvestiia Akademii Nauk SSSR, Seriia Fizicheskaia,* v. 20, no. 6, June 1956, p. 664-670.

Mechanism of distortions of the atomic crystal lattice of metals subjected to compression. Negative role of residual distortions of crystal lattice as far as later fracture of the metal is concerned.
(Q24, M26, Al, ST, Fe)

978-Q. (Russian.) **X-Ray Study of Phenomena Accompanying High-Temperature Creep of Steel.** M. Ia. Fuks, N. V. Slonoskii and L. I. Lupilov. *Izvestiia Akademii Nauk SSSR, Seriia Fizicheskaia,* v. 20, no. 6, June 1956, p. 671-675.

Relation of dimensions of mosaic blocks and microstresses to the character of the deformation, rate of deformation and temperature.
(Q3, AY)

979-Q. (Russian.) **X-Ray Analysis of Structural Changes in Metals During Creep.** L. M. Rybakova. *Izvestiia Akademii Nauk SSSR, Seriia Fizicheskaia,* v. 20, no. 6, June 1956, p. 676-678 + 2 plates.

Varying degrees and rates of deformation in Armco iron specimens at room temperature and 450° C.
(Q3, Fe)

980-Q. (Russian.) **Effect of Texture on the Intensity of Interference Lines in the Study of Large-Sized Deformed Specimens.** M. Ia. Fuks and G. V. Dobrovol'skaia. *Izvestiia Akademii Nauk SSSR, Seriia Fizicheskaia,* v. 20, no. 6, June 1956, p. 679-683.

Study of microdistortions in the crystal lattice in rolled specimens. Relation of intensity to degree of deformation at different loads.
(Q24 AY)

981-Q. (Russian.) **Secondary Hardness in Steels Alloyed With Vanadium, Molybdenum or Titanium.** L. V. Zaslavskaia, S. T. Kishkin, N. F. Lashko, A. F. Platonova, N. M. Popova

and M. F. Rybina. *Izvestiia Akademii Nauk SSSR, Seriia Fizicheskaia,* v. 20, no. 6, June 1956, p. 684-688.

Relation of hardness and amount of vanadium (in high-dispersion vanadium carbide) to tempering temperature and composition of steel. Same relation for titanium and for molybdenum. (Q29, J29, AY)

982-Q. (Russian.) **X-Ray Study of the Quality of the Surface on Finely Ground and Machined Metals.** Iu. S. Terminasov, A. G. Iakhontov and A. V. Poltavskii. *Izvestiia Akademii Nauk SSSR, Seriia Fizicheskaia,* v. 20, no. 6, June 1956, p. 689-692.

Parallels in structural changes and microhardness between a finely machined surface and the surface produced by grinding and polishing. Dislocations and distortions in lattice and reduction in size and deformation. (Q29, M26, G18)

983-Q. (Russian.) **Mechanism of the Effect of Small Additions on the Formation of Recrystallization Textures in Metals and Alloys.** D. I. Lainer and E. I. Krupnikova. *Izvestiia Akademii Nauk SSSR, Seriia Fizicheskaia,* v. 20, no. 6, June 1956, p. 693-694.

Properties required of additives to minimize anisotropic tendencies. Factors affecting preferred orientation. (Q24, N5, Al, Cu, Ni)

984-Q. (Russian.) **Residual Stresses in Metals After Grinding.** O. G. Karpinskii and B. M. Levitskii. *Izvestiia Akademii Nauk SSSR, Seriia Fizicheskaia,* v. 20, no. 6, June 1956, p. 700-702.

Distribution of residual stresses in surface layers of Armco iron specimens after grinding. Values of second order residual stresses. (Q25, G18, Fe-a)

985-Q. (Russian.) **Hardenability and Distribution of Hardness at a Cross Section of a Hardened Steel Body.** M. E. Blanter and A. A. Goldenberg. *Metallovedenie i Obrabotka Metallov,* no. 8, Aug. 1956, p. 12-20.

Develops and experimentally tests a method for determining distribution or hardness over a cross section of a steel article without cutting through it. Develops nomograms for practical application of the method. (Q29, ST)

986-Q. (Russian.) **The Effects of Various Types of Treatment on the Fatigue Strength of E1434 Steel.** B. I. Aleksandrov and A. P. Shishkova. *Metallovedenie i Obrabotka Metallov,* no. 8, Aug. 1956, p. 20-27.

Various tests for determining effects of treatment. Most effective means for increasing fatigue strength in cold working or surface peening. (Q7, AY)

987-Q. (Russian.) **The Effects of Heat Treatment on the Blue Brittleness of Structure Steel.** G. I. Pogodin-Alekseev and M. M. Fetisova. *Metallovedenie i Obrabotka Metallov,* no. 8, Aug. 1956, p. 31-37.

Tests made on steel 55. Blue brittleness begins at about 340° C. and reaches maximum value at 540° C. Effects of blue brittleness at various temperatures on the plasticity and impact strength. (Q23, Q7, AY)

988-Q. (Russian.) **Naphthalene Type Fracture in High Speed Steel.** L. B. Getsov. *Metallovedenie i Obrabotka Metallov,* no. 8, Aug. 1956, p. 42-43.

Discussion of the defect. A method for reclaiming articles which are subject to failure from naphthalene fracture. (Q26, TS)

989-Q. (Russian.) **Testing the Deformation Properties of Commercial Cast Steel.** G. N. Mekhed. *Metallovedenie i Obrabotka Metallov,* no. 8, Aug. 1956, p. 43-47.

Effects of temperature and chemical properties on plastic properties of killed and rimmed cast steel. (Q23, CI)

990-Q. (Spanish.) **Chemical Composition, a Probable Indication of the Mechanical Quality of Gray Spiegel Iron.** J. Navarro-Alcacer. Paper from "XXVIII Congreso Internacional de Quimica Industrial", v. I. Saez, p. 563-568.

Study of a probable relation between the chemical composition understood as "index of saturation" and the various coefficients of mechanical resistance, especially the ultimate tensile strength. (Q23, CI)

991-Q. The Measurement of the Thermal Stability of Titanium Alloys. F. R. Schwartzberg, W. D. Rahr, D. N. Williams and R. I. Jaffee. *Battelle Memorial Institute, Titanium Metallurgical Laboratory Report* No. 55, Oct. 1956, 30 p.

Effects of variations in stress and strain during exposure, time and temperature of exposure, hydrogen content and surface contamination on room-temperature mechanical properties. (Q general, Ti)

992-Q. Some Considerations of Wear in Marine Gearing. W. H. Darlington. *Institute of Marine Engineers, Transactions,* v. 58, Sept. 1956, p. 289-308.

Design, manufacture and operation of three sets of marine double reduction gears. (Q9)

993-Q. Effect of Finishing Temperatures on Properties of Hot Rolled Steel Plate. R. H. Frazier, F. W. Boulger and C. H. Lorig. *Iron and Steel Engineer,* v. 33, Oct. 1956, p. 67-79.

Resistance of hot rolled steel plate to brittle fracture can be increased by lowering the finishing temperature. After normalizing, aluminum-killed steels have finer ferrite grain size than semikilled steels. Lowering finishing temperature also raises yield strength and produces smaller ferrite grain size. (Q26, Q23, F23, ST)

994-Q. Variation in Fatigue Properties Over Individual Casts of Steel. I. Investigation of a Cast of Steel to B.S. 970 Specification En. 100. E. Ineson, J. Clayton-Cave and R. J. Taylor. *Iron and Steel Institute, Journal,* v. 184, Oct. 1956, p. 178-185.

Investigation to establish whether or not the fatigue properties of the rolled products of commercial steel ingots vary significantly within an individual ingot and from ingot to ingot in a given cast of steel. (Q7, CI)

995-Q. Effect of Melting and Casting Atmospheres on Cast Nickel Alloys. C. M. Hammond and R. A. Flinn. *Journal of Metals,* v. 8, sec. 1, Oct. 1956, p. 1450-1456.

Rupture strength and elongation determined at elevated temperatures. Increased strength was most pronounced in high-boron alloys of the Guy type, while improvement in ductility was apparent in all cases. (Q4, E25, Ni)

996-Q. Observations on Mechanical Properties of Hydrogenated Vanadium. B. W. Roberts and H. C. Rogers. *Journal of Metals,* v. 8, sec. 2, *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Oct. 1956, p. 1213-1215.

Vanadium foils and wires, either cold worked or recrystallized, show a ductile-brittle-ductile fracture sequence with temperature. (Q23, N15, V)

997-Q. Creep of Polycrystalline Nickel. J. Weertman and P. Shahinian. *Journal of Metals,* v. 8, sec. 2, *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Oct. 1956, p. 1223-1226.

Nickel samples were measured in the stress region of 2.5×10^7 to 2.8×10^9 dyne per sq. cm. and the temperature region of 400 to 1100° C. Activation energy of creep is approximately 65,000 cal. per mol. (Q3, Ni)

998-Q. Constant Strain Rate Bend Tests on Hydrogen-Embrittled High Strength Steels. W. Beck, E. P. Klier and G. Sachs. *Journal of Metals,* v. 8, sec. 2, *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Oct. 1956, p. 1263-1268.

Mechanical tests used to determine effects of hydrogen embrittlement on the strength and ductility of steels. (Q5, Q23, AY)

999-Q. High Damping Ferromagnetic Alloys. A. W. Cochardt. *Journal of Metals,* v. 8, sec. 2, *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Oct. 1956, p. 1295-1298.

Wires of 55 binary and ternary cobalt, iron, nickel and chromium alloys were twisted and the decay of the free torsion vibration was measured at torsion stresses between 500 and 8000 psi. (Q8, Fe)

1000-Q. Structural Changes in Molybdenum Single Crystals Due to Cold Rolling. N. Ujiiye and R. Maddin. *Journal of Metals,* v. 8, sec. 2, *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Oct. 1956, p. 1298-1304.

Lattice rotations for various degrees of rolling were observed. Relationships between initial and end orientations were analyzed. (Q24, Mo)

1001-Q. Effect of Plastic and Elastic Stresses on the Losses and the Domain Configurations of Grain-Oriented 3 Pct. Si-Fe. P. W. Neurath. *Journal of Metals,* v. 8, sec. 2, *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Oct. 1956, p. 1319-1324.

Permanent, plastic elongation of about 0.1% almost doubles the 60-cycle watt losses. Subsequent application of tension in the elastic range eliminates this loss increase. (Q21, Q23, P17, TS)

1002-Q. Plastic Anisotropy of Zinc Monocrystals. John J. Gilman. *Journal of Metals,* v. 8, sec. 2, *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Oct. 1956, p. 1326-1336.

Glide on the basal and prismatic planes of monocrystals was investigated at 250 to 400° C. Prismatic glide obeys Schmid's law. Creep of polycrystalline zinc is controlled by

prismatic glide at high temperatures. (Q3, M26, Zn)

1003-Q. Nonoctahedral Slip in Aluminum. T. Ojala, C. Elbaum and W. C. Winegard. *Journal of Metals,* v. 8, sec. 2, *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Oct. 1956, p. 1344-1345.

Reports the observation of characteristics in the grain boundary region of an aluminum bicrystal and tricrystal, both deformed in tension at room temperature. (Q24, Al)

1004-Q. Ti-36 Pct. as a Base for High-Temperature Alloys. Joseph B. McAndrew and H. D. Kessler. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Oct. 1956, p. 1348-1353.

An experimental survey of the oxidation resistance, stress-rupture strength, creep and impact strength at elevated temperature.
(Q3, Q4, Q6, R2, Ti, Al)

1005-Q. Variations in Radiation Damage to Metals. C. A. Bruch, W. E. McHugh and R. W. Hockenbury. *Journal of Metals,* v. 8, sec. 2; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Oct. 1956, p. 1362-1372.

Groups of metals were irradiated at approximately equal exposure conditions in the Materials Testing Reactor. Measurements were made of some mechanical and physical properties to determine the extent of damage. (Q general, P15, M26)

1006-Q. Development of Nickel-Chromium Base Alloys for High-Temperature Service. II. Creep, Rupture and Otner Properties. W. Betteridge and A. W. Franklin. *Metal Treatment and Drop Forging,* v. 23, Oct. 1956, p. 385-389.

Progressive improvement in Nimonic alloys has resulted in increasing resistance to creep and rupture at elevated temperatures. Corresponding improvement in fatigue strength and in short-time tensile and torsion properties is associated with increasing creep resistance.
(Q3, Q4, Ni)

1007-Q. Internal Friction Methods Applied to Metallurgical Problems. II. Practical Applications. W. R. Thomas and G. M. Leak. *Metal Treatment and Drop Forging,* v. 23, Oct. 1956, p. 413-419.

Application of technique to study of interstitial solutions, movement of lattice dislocations during stressing and relaxation of stress across a grain boundary. (Q22, M26, M27)

1008-Q. Final Report—Development and Testing of Vacuum Melted Nickel-Molybdenum Alloys With Minor Alloying Additions. O. Preston, N. J. Grant and C. F. Floe. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission),* ORNL-2181, Oct. 1956, 37 p.

Stress-rupture tests, tensile tests and metallographic examination of various compositions indicate degree of stabilization conferred by additions of chromium, iron, vanadium and columbium.
(Q4, Q23, N6, Mo, Ni)

1009-Q. On the Theory of the Low-Temperature Internal Friction Peak Observed in Metals. Alfred Seeger. *Philosophical Magazine,* v. 1, ser. 8, no. 7, July 1956, p. 651-662.

The relaxation phenomenon is thought to be due to dislocations which are confined by the Peierls stress to certain crystallographic directions. Under combined action of thermal fluctuations and applied stress they may form pairs of kinks.
(Q22, M26)

1010-Q. A Fixture for Testing Sheet Materials in Compression at Elevated Temperatures. D. C. Hayward. *Royal Aeronautical Society, Journal,* v. 60, Oct. 1956, p. 669-674.

A fixture for testing under edgewise compression sheet materials up to temperatures of 400° C. Tensile and compressive properties of titanium and aluminum materials.
(Q25, Q28, Al, Ti)

1011-Q. The Effect of Stress Concentrations on the Fatigue Resistance of a Duralumin Type Aluminum Alloy. J. Y. Mann. *Royal Aeronautical Society, Journal,* v. 60, Oct. 1956, p. 681-685.

Fatigue curves were established under a wide range of theoretical stress concentration factors. Notch sensitivity is assessed. (Q7, Al)

1012-Q. How Much Does Lead Change Steel? *Steel,* v. 139, Oct. 29, 1956, p. 122-123.

Results of tests on C-1050 and C-1141 steels. Impact transition temperatures average 22° F. lower.
(Q6, Pb, ST)

1013-Q. Impact Performance of Synthetically Reproduced Heat-Affected-Zone Microstructures in "T-1" Steel. Ernest F. Nippes and Craig R. Sibley. *Welding Journal,* v. 35, Oct. 1956, p. 473s-480s.

Laboratory investigation indicates that, based on results with particular heat tested, "T-1" steel is not embrittled by the thermal cycles of welding. (Q6, Q23, N8, K1, ST)

1014-Q. Some Effects of Minor Elements on the Characteristics of Plain-Carbon Steels. Francis W. Boulger. Paper from "A Study of the Iron and Steel Industry in Latin America". v. II. United Nations, p. 393-400, 419-420.

Effects of sulphur, phosphorus and nitrogen on the properties of low and medium-carbon steels. (Q general, P general, CN)

1015-Q. (English.) **Some New Problems Arising From Electron Microscope Studies of the Plastic Deformation of Metals.** A. F. Brown. *Revue Universelle des Mines,* v. 12, ser. 9, no. 10, Oct. 1956, p. 501-507.

Significance of surface phenomena as well as subsurface conditions related to plastic deformation. (Q24)

1016-Q. (Czech.) **Contribution to the Comparison of the Czechoslovak Carburizing Steels.** Rudolf Stefec and Jaroslav Dobry. *Hutnické Listy,* v. 11, no. 9, Sept. 1956, p. 536-541.

The impact resistance of 10 carburized steels at room temperatures and below, before and after carburizing, were determined. (Q6, J28, ST)

1017-Q. (Czech.) **Evaluation of Creep Tests.** Rudolf Pospisil. *Hutnické Listy,* v. 11, no. 9, Sept. 1956, p. 547-552.

Enlarges on the method proposed by Larson and Miller for evaluation of tests in several alloy steels. (Q3, AY)

1018-Q. (French.) **Stress Analysis by Photo-Elastic Varnishes.** F. Zandman. *Acier, Stahl, Steel,* v. 21, no. 9, Sept. 1956, p. 356-364.

Varnishes considered are prepared in liquid form and applied by brushing, spraying or dipping, or are prepared in form of sheets of constant thickness and cemented on test surfaces. (Q25, CN, SS)

1019-Q. (French.) **A Study on Preferential Orientations in Copper as Extruded, Stretched and Annealed.** Paul Bastien and Jean Pokorny. *Revue de Métallurgie,* v. 53, no. 9, Sept. 1956, p. 649-659.

X-ray examination shows the existence of a double texture, one part of which weakens during recrystallization at increasing temperatures, and grows much stronger at high temperatures. (Q24, N5, Cu)

1020-Q. (French.) **A Study of Mechanical Properties at Very High Temperatures.** C. Boulanger and C. Crussard. *Revue de Métallurgie,* v. 53, no. 9, Sept. 1956, p. 715-728.

A special apparatus was built to record the effort-deformation cycles from room temperature up to 1550° C. (Q24)

1021-Q. (German.) **Creep Phenomena in Metals Under Load.** W. Späth. *Metall,* v. 10, no. 19-20, Oct. 1956, p. 910-915.

Elementary processes in metals under load, initiation and effect of ultrasonic waves, heating of plastically deformed materials, phenomena during creep. (Q3)

1022-Q. (German.) **Impact Resistance of Titanium.** O. Rüdiger and W. Knorr. *Technische Mitteilungen Krupp,* v. 14, no. 4, Sept. 1956, p. 105-113.

Effect of temperature, shape and direction of rolling. Impact resistance of pure titanium; effect of impurities and of hydrogen. (Q6, Ti)

1023-Q. (German.) **Change in Mechanical and Technological Properties of Titanium Wires After Cold Drawing.** A. Pfützenreuter. *Technische Mitteilungen Krupp,* v. 14, no. 4, Sept. 1956, p. 115-120.

Experimental data; comparison with data on stainless steel properties. (Q general, F28, Ti, SS)

1024-Q. (Polish.) **Properties of Chromium Steel of the Type 15H (CCl) for Carburizing.** S. Orzechowski and C. Gawin. *Prace Instytutow Ministerstwa Hutnictwa,* 1956, no. 3, p. 117-154.

Changes in properties were analyzed in relation to the conditions of second hardening and were correlated with the changes taking place at the same time in the structure of steel. (Q general, J28, AY)

1025-Q. (Polish.) **Heat Treatment of Pearlitic Malleable Cast Iron.** Mikolaj Dubowicki, Waclaw Sakwa and Stefan Pieprznik. *Przeglad Odlewnictwa,* v. 6, no. 9, Sept. 1956, p. 258-267.

Establishes mechanical properties of pearlitic iron as influenced by temperature and time of heating before hardening as by annealing. (Q23, J23, CI)

1026-Q. (Russian.) **Methods of Testing Metallic Specimens With Different Stress Concentration in Static and Impact Torsion.** N. G. Mikhailichenko. *Zavodskaia Laboratoriia,* v. 22, no. 9, Sept. 1956, p. 1081-1086.

A method of torsion testing which produces a nonuniform stress distribution. (Q1)

1027-Q. (Russian.) **Methods of Determining the Relationship Between the Propagation Velocities of the Plastic**

and the Elastic Deformation. D. A. Kal'ner. *Zavodskaia Laboratoriia,* v. 22, no. 9, Sept. 1956, p. 1086-1089.

An experimental basis for, and a method of computing the velocity of propagation of plastic deformation in metals from the known propagation velocity of elastic deformation, which is equal to the velocity of sound in the material. (Q21, Q24)

1028-Q. (Russian.) **Bend Testing of Specimens With Stress Concentrations.** E. S. Volokhvianskaia. *Zavodskaia Laboratoriia,* v. 22, no. 9, Sept. 1956, p. 1095-1098.

Bend testing of specimens of a configuration conducive to nonuniform stress concentrations provides an independent additional characteristic of the serviceability of a metal. (Q5, ST)

1029-Q. (Russian.) **Certain Regularities of Mechanical Strength of Products Obtained by Sintering of Powdered Metals.** B. I. Pines and N. I. Sukhinin. *Zhurnal Tekhnicheskoi Fiziki,* v. 26, no. 9, Sept. 1956, p. 2076-2085.

Relation between tensile strength, porosity and temperature. Values for copper; β:n ratio. (Q27, H15, Cu)

1030-Q. (Russian.) **X-Ray Study of the Nature of Destruction Under an Impact Load.** D. M. Vasil'ev, G. I. Margolin and S. V. Dianov. *Zhurnal Tekhnicheskoi Fiziki,* v. 26, no. 9, Sept. 1956, p. 2119-2124.

Relation between second degree distortion on impact and force of destruction. Method of detection. (Q6)

1031-Q. Formability of Metals. II. The Carbon Steels. Lester F. Spencer. *Finish,* v. 13, Nov. 1956, p. 44, 46-48.

Basic characteristics of metals, materials for cold forming, and divisions of cold forming methods analyzed. (To be continued.) (Q23, G general, CN)

1032-Q. Magnesium Alloy Moves Temperature Barrier Upward. R. E. Bockrath. *Iron Age,* v. 178, Nov. 1, 1956, p. 98-101.

Thorium-bearing magnesium alloy exhibits acceptable tensile properties up to 600° F. in extended service, 800° F. in short exposures. (Q23, Mg)

1033-Q. Effect of Hydrogen on Alpha Titanium Alloys. G. A. Lenning, J. W. Spretnak and R. I. Jaffee. *Journal of Metals,* v. 8, sec. 2; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Oct. 1956, p. 1235-1240.

The effect of up to 200 ppm. on the microstructure and mechanical properties of high-purity titanium containing oxygen, nitrogen, tin and aluminum. Increasing the hydrogen content resulted in precipitation of a hydride phase and decreased notch-bend impact strength. (Q23, Q6, N7, M27, Ti)

1034-Q. Some Observations on the Structure of Grain Boundary Fracture Surfaces. H. C. Chang and Nicholas J. Grant. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, sec. 2, Oct. 1956, p. 1241-1247.

A 20% Zn-Al alloy fractured in an intercrystalline manner both in creep tests at 500° F. and tensile tests. The fracture surfaces studied by microscopy and X-rays were made up of fracture facets. (Q26, M27, Zn, Al)

1035-Q. Influence of Silicon and Aluminum on the Properties of Hot Rolled Steel. R. H. Frazier, F. W. Boulger and C. H. Lorig. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, sec. 2, Oct. 1956, p. 1269-1276.

Silicon added to steel acted as a deoxidizer and lowered the ductile-brittle transition temperature of the steel plate. Increasing aluminum contents up to 0.20% lowered the transition temperature at a rate depending on the amount of silicon and manganese present. (Q23, ST)

1036-Q. Effect of Mo, W, and V on the High Temperature Rupture Strength of Ferritic Steel. A. E. Powers. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, sec. 2, Oct. 1956, p. 1373-1377.

Both high and low testing temperatures were considered. Results were correlated with effectiveness of the alloying elements in the form of carbides and in solid solution. Tempering behavior was also studied. (Q4, J29, AY)

1037-Q. Activation Energy for High Temperature Creep of High Purity Aluminum. H. I-Lieh Huang, O. D. Sherby and J. E. Dorn. *Journal of Metals.* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, sec. 2, Oct. 1956, p. 1385-1388.

New technique used, involving rapid changes of temperature. Activation energy was found to be 32,200 $\pm$ 1770 cal. per mol., insensitive to stress over the range of approximately 580 to 3500 psi., and insensitive to strain up to 40%. (Q3, Al)

1038-Q. Some Creep Tests on Steels for Prestressed Concrete. G. M. Canta. *Metaalinstituut T. N. O.,* no. 39, June 1956, 12 p.

Some 30 creep tests in which the stresses were varied over a wide range of values. Steels investigated were cold drawn steel wire, cold drawn and aged steel wire, and hardened and tempered steel wire. (Q3, ST)

1039-Q. (English.) **The Influence of Temperature on Pre-Yield Plastic and Anelastic Microstrain in Low Carbon Steel.** J. A. Hendrickson, D. S. Wood and D. S. Clark. *Acta Metallurgica,* v. 4, no. 6, Nov. 1956, p. 593-601.

Rates of pre-yield microstrain when stress is first applied are compared with the theoretical rates for the thermally activated release of dislocations from atmospheres of interstitial solute atoms. (Q21, Q23, CN)

1040-Q. (Russian.) **The Influence of Thermomechanical Treatment on the Cold Shortness of Alloy Structural Steels.** E. N. Sokolkov. *Fizika Metallov i Metallovedenie,* v. 3, no. 1, 1956, p. 79-82.

Recrystallization was suppressed by lowering rolling temperature and reducing the interval between the end of rolling and the hardening to 1 to 2 sec. (Q23, F23, AY)

1041-Q. (Russian.) **A Study of Step-Wise Deformation by the Electrical Conductivity Method.** V. N. Rozhanskii, Iu. V. Goriunov, and E. D. Shchukin. *Fizika Metallov i Metallovedenie,* v. 3, no. 1, 1956, p. 113-126.

Methods and results of measuring electrical resistance changes at the time of occurrence of deformation slips in zinc single crystals. Some of the results are treated in the light of the dislocation concept. (Q24, M26, Zn)

1042-Q. (Russian.) **On the Plasticity Laws.** I. N. Vinogradov and Iu. I. Iagn. *Fizika Metallov i Metallovedenie,* v. 3, no. 1, 1956, p. 127-134.

Derives approximation formulas for computing deformation from a given stress for beryllium bronze and pure iron. (Q23, Q24, Be, Cu, Fe)

1043-Q. (Russian.) **Destruction of Aluminum Bronze Specimens.** I. N. Vinogradov and Iu. I. Iagn. *Fizika Metallov i Metallovedenie,* v. 3, no. 1, 1956, p. 135-138.

Yield points of aluminum bronze specimens in linear, bi-axial and tri-axial compression and in linear tension. (Q23, Cu)

1044-Q. (Russian.) **Temperature Mosaics and the Instantaneous Secondary Stresses in Impact Deformation of Two-Phase Metals.** G. P. Zaitsev and Iu. E. Bondarev. *Fizika Metallov i Metallovedenie,* v. 3, no. 1, 1956, p. 139-145.

Calculation of instantaneous secondary stresses developing when the phases or various structural constituents differ with respect to their resistance to plastic deformation. (Q6, Q24)

1045-Q. (Russian.) **On the Initial Stage of Plastic Deformation in Polycrystalline Metals and the Influence of the Grain Size. I. Aluminum. II. Iron.** Ia. R. Rauzin, and A. R. Zhelezniakova. *Fizika Metallov i Metallovedenie,* v. 3, no. 1, 1956, p. 146-161.

A study of the first and second intergrain stages of deformation of polycrystalline metals. Peculiarities of the process in the cases of aluminum and iron. (Q24, Al, Fe)

1046-Q. (Russian.) **Determination of Susceptibility of Structural Ferritic Steels to Cold Shortness From the Tension Test Data for Flat Specimens.** P. O. Pashkov and V. A. Bratukhina. *Fizika Metallov i Metallovedenie,* v. 3, no. 1, 1956, p. 162-171.

An attempt on the basis of tensile data for standard flat specimens at changing temperatures, to investigate the susceptibility to brittleness of ordinary alloyed and nonalloyed structural steels. Plasticity change at dropping temperatures studied as a parameter most indicative of the susceptibility to cold shortness. (Q27, Q23, ST)

1047-Q. (Russian.) **The Effect of Certain Alloying Elements on the Susceptibility of Steel to Temper Brittleness.** M. L. Bernshtein. *Metallovedenie i Obrabotka Metallov,* no. 9, Sept. 1956, p. 25-30.

Investigates susceptibility of steels to temper brittleness by tests for impact strength to determine the thresholds of cold shortness for ductile and brittle specimens. (Q23, ST)

1048-Q. (Russian.) **Increasing the Contact Fatigue Strength of Steel Plates by Surface Cold Working.** I. V. Kudriavtsev and N. M. Savvina. *Metallovedenie i Obrabotka Metallov,* no. 9, Sept. 1956, p. 31-41.

A study of the fatigue strength in contact zones of steel plates 50 mm. thick and of improving this strength by cold working. (Q7, G general, ST)

1049-Q. (Russian.) **Ways of Detecting Woody Fracture.** M. I. Gol'dshtein. *Stal',* v. 16. no. 9, Sept. 1956, p. 809-811.

Woody fracture is related to the laminar inhomogeneity of metal structure . (Q26, ST)

1050-Q. (Russian.) **Anisotropy of Mechanical Properties of Steel Ingots Melted and Poured Under Vacuum.** Ia. B. Gurevich. *Stal'*, v. 16, no. 9, Sept. 1956, p. 815-817.

A comparison of the mechanical properties of steel specimens cut from differently oriented portions of a column-shaped ingot. Vacuum melted and poured carbon steels and alloyed austenitic steel. (Q general, D8, CN, AY)

1051-Q. (Russian.) **Mechanical Properties of Cold Worked Steel Wire.** K. I. Tulenkov, M. I. Zlotnikov and S. F. Bobyleva. *Stal'*, v. 16, no. 9, Sept. 1956, p. 821-825.

Nomograms, based on theory and experiments, which serve for a quick determination of the mechanical properties of carbon steel wire from the initial parameters of its production, and vice versa. (Q23, CN)

1052-Q. (Book.) **Bibliography on Low Temperature Characteristics of Steels, 1904-1954, With Author Index.** Katherine Janis. Rev. Ed., 56 p. 1955. The International Nickel Co., Inc., 67 Wall St., New York 5, N. Y.

564 references. (Q general, ST)

SECTION R

CORROSION

1-R. Initial Studies on the Effect of High Level Gamma Radiation on Corrosion of Metals. F. Hittman and O. A. Kuhl. *Brookhaven National Laboratory (U. S. Atomic Energy Commission),* BNL-2257, July 1955, 24 p.

Considers various structural materials in corrosive chemical systems from room temperature to 500° C. Diagrams, graph, photographs, micrographs. 10 ref. (R11)

2-R. Control of Couples Developed in Water Systems. G. B. Hatch. *Corrosion,* v. 11, Nov. 1955, p. 461-468.

Solution of copper by water on passage through cuprous portions of the system and its subsequent deposition on the ferrous metal portions is prevented by 2-benzothiazolethiol which inhibits water attack on the copper. Table, graphs. 8 ref. (R10, Fe, Cu)

3-R. Corrosion of Lead-Lined Sulfuric Acid Evaporators. W. J. Cotton. *Corrosion,* v. 11, Nov. 1955, p. 469-470.

Two cases involving failure by corrosion of lead linings in evaporators reported to determine causes of failure. (R6, Pb)

4-R. Corrosion Control on Offshore Drilling and Producing Equipment. Charles J. Fritts. *Corrosion,* v. 11, Nov. 1955, p. 471-476.

Steel piling is preferred for offshore stationary drilling platforms. Specific recommendations for corrosion control are made for the three areas into which the platform is divided. Photographs, graphs. (R general)

5-R. The Electrochemical Behavior, Including Hydrogen Overvoltage, of Iron in Acid Environments. Milton Stern. *Electrochemical Society, Journal,* v. 102, Nov. 1955, p. 609-616.

Corrosion rate of pure iron in deaerated acid media studied as a function of pH and related to electrochemical behavior. Graphs, diagram. 21 ref. (R5, R11, Fe)

6-R. A Further Study of the Oxidation of Titanium and Its Alloys at High Temperatures. A. E. Jenkins. *Institute of Metals, Journal,* v. 23, Sept. 1955, p. 1-9.

Investigations were completed in the temperature range 650 to 950° C. and at oxygen pressures ranging from 700 to 40 mm. of mercury. The initial period in the oxidation of the pure metal conforms to a parabolic law, which is valid until the formation of an initial coherent scale layer on the specimen to what appears to be a constant thickness. Diagrams, graphs, tables. 5 ref. (R2, Ti)

7-R. Effect of Heat Treatment on the Corrosion Behavior of Zirconium Binary Alloys of Nickel and Iron. D. S. Kneppel. *Nuclear Metals, Inc. (U. S. Atomic Energy Commission),* NMI-1137, June 1955, 42 p.

Behavior in 680° F. water depends on condition of transformation stress in metal, presence of second phase zirconium compound of iron and nickel and amount of iron or nickel in solution in alpha zirconium. Tables, micrographs. 9 ref. (R4, J2, Zr)

8-R. (French.) **The Precipitation of Fe_3O_4 in Scales Formed by Oxidation of Iron at Elevated Temperatures.** J. Paidassi. *Acta Metallurgica,* v. 3, no. 5, Sept. 1955, p. 447-451.

Precipitation, observed in the FeO layer, forms only during their cooling down by decomposition of the monoxide; prevention of this decomposition is more difficult if the oxidation or re-oxidation temperature is above 980° C.; the oxygen concentration in FeO rich in oxygen is the predominating factor in

their instability during rapid cooling. Micrographs. 5 ref. (R2, Fe)

9-R. (German.) **Influence of Steam Admixtures on the Durability of Turbine Blades.** M. Werner. *Brennstoff-Wärme-Kraft,* v. 7, no. 10, Oct. 1955, p. 433-439.

Investigates action of pH number on blade deterioration; evaluates Splittgerber and Pohl's hypothesis of sulfide action on nickel steel turbine blades. Photographs, micrographs, graphs, tables, diagram. 5 ref. (R4, ST, Ni)

10-R. (German.) **Condenser and Preheater Corrosion.** W. Katz. *Brennstoff-Wärme-Kraft,* v. 7, no. 10, Oct. 1955, p. 439-445.

Corrosion phenomena on copper occurring in connected condensers and preheaters; material and its selection; suggestions for preventive measures. Graphs, photographs, table. 7 ref. (R4, Cu)

11-R. (German.) **Contribution to Scaling of Rolled Materials by Flames.** H. Wiegand, K. Schaar and F. Nieth. *Metalloberfläche,* Ausgabe A, v. 9, no. 10, Oct. 1955, p. 162-173.

Studies of scaling of different rolled materials caused by acetylene flames. Diagram, graphs, micrographs, tables. 13 ref. (To be continued.) (R2)

12-R. (Italian.) **Problem of the Protection of Methane Pipes Against Electrolytic Corrosion. I. Electrolytic Corrosion: Causes, Characteristics, and Methods of Protection. II. Cathodic Protection.** G. Bianchi. *Rivesta dei combustibili,* v. 9, nos. 8-9, Aug.-Sept. 1955, p. 675-711.

Thermodynamic and kinetics aspects, passive and active protection, electrical and electrochemical cathodic protection. Diagrams, graphs. 6 ref. (To be continued.) (R1, R10, R8)

13-R. (Polish.) **The Chemical Action of Chlorine and Its Compounds on Metals and Metallic Oxides.** Wladyslaw Domanski. *Archiwum gornictwa i hutnictwa,* v. 3, no. 3, 1955, p. 401-435.

Method of calculating chemical affinity of metals for chlorine gas as a function of temperature illustrated in its application to the analysis of the Betterton process. Results confirmed by the data of metallurgical practice. Graphs, tables. 11 ref. (R9)

14-R. Stress-Corrosion Cracking of Welded Joints. R. N. Parkins. *British Welding Journal,* v. 2, Nov. 1955, p. 495-501.

Stress-corrosion cracks in welded joints are usually due to residual tension stresses in the joints, but may arise from the development of a critical metallographic structure in the heat-affected zone. Graph, micrograph, photographs, tables. 26 ref. (R1, K9)

15-R. Reduction of Iron and Copper Corrosion in Steam and Water Cycle With Amines. S. M. Sperry. *Combustion,* v. 27, Nov. 1955, p. 65-71.

Treatment of boiler feedwater for elimination of corrosion. Tables, graphs. 6 ref. (R10, R4, Fe, Cu)

16-R. Electrode Potentials. I. G. W. Akimov. *Corrosion,* v. 11, Nov. 1955, p. 477-486. (Translated from the Russian by R. B. Mears and J. D. Gat.)

Electrode potentials of a metallic surface immersed in an electrolyte are important in considering corrosion behavior. Reversible and irreversible electrode potentials, theory of electrode potentials, irreversible potentials of electrodes, factors affecting electrode potentials studied. Diagrams, graphs, tables. (To be continued.) (R11)

17-R. Use of Ammonia to Prevent Casing Corrosion. H. E. Greenwell, Rado Loncaric, and Harry G. Byars. *Corrosion,* v. 11, Nov. 1955, p. 491-496.

Laboratory experiments and special injection equipment solve problems in use of ammonia to stifle casing corrosion. Graphs, photographs, tables. 8 ref. (R10)

18-R. Electrochemical Studies of the Hydrogen Sulfide Corrosion Mechanism. Scott P. Ewing. *Corrosion,* v. 11, Nov. 1955, p. 497-501.

Anodic and cathodic reactions are given, and the corrosion process explained in terms of electrochemical properties of the corroding solution and corrosion products. Graphs. 8 ref. (R1)

19-R. Atmospheric Corrosion of Aluminium Alloys in a Large Chemical Factory and Their Protection by Painting. W. D. Clark. *Institute of Metals, Journal,* v. 84, Oct. 1955, p. 33-41 + 3 plates.

A total of 1100 specimens of five aluminum alloys in different conditions of heat treatment and a few mild steel specimens were exposed for 4 years and observations made on their rate of deterioration. Relative merits of 18 paint systems used

on the aluminum alloys. Tables, micrographs, photographs. 3 ref. (R3, L26, Al)

20-R. Attack of Metals by Sulfur and Gaseous Sulfur Compounds. O. Kubaschewski and O. von Goldbeck. *Henry Brutcher Translation No.* 3115, 16 p. (From *Metalloberfläche,* v. 8, no. 3, 1954, p. A33-A36.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 192-R, 1954. (R2, R9)

21-R. Behavior of Titanium in Gases at High Temperatures. P. Spinedi. *Henry Brutcher Translation No.* 3585, 10 p. (From *Aluminio,* v. 23, 1954, p. 35-39.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 231-R, 1954. (R2, Ti)

22-R. (Hungarian.) **The Effect of Varying the Experimental Factors Upon the Results of the Mylius Corrosion Test.** Gabor Szönyi. *Kohäszati lapok,* v. 10, no. 10, Oct. 1955, p. 444-451.

Investigations for determining sources of error, limits of accuracy and recommended applications. Graphs, tables, micrographs, photographs, diagram. 13 ref. (R11)

23-R. (Hungarian.) **Corrosion Damage in the Hungarian Chemical Industry.** Klara Kovacs. *Magyar kémikusok lapja,* v. 10, no. 10, Oct. 1955, p. 306-309.

Evaluation of the data collected for 1953 by the Corrosion Observation Service; damages and costs, methods of combatting damage. Tables. 5 ref. (R general)

24-R. A Study of the Reaction of Metals and Water. H. M. Higgins. *Aerojet-General Corporation (U. S. Atomic Energy Commission),* AECD-3664, Apr. 1955, 59 p.

Reactions of molten zirconium, Zircaloy-2, uranium, uranium-molybdenum alloy, aluminum, aluminum-lithium alloy and magnesium with water. Corrosion rate tests of zirconium, uranium-molybdenum alloy, and stainless steel in water at atmospheric pressure and at 600 psi. Photographs, graphs, diagrams, tables. 12 ref. (R4, R11, Zr, U, Mo, Al, Li, Mg)

25-R. The Cathodic Protection of Ships Against Sea-Water Corrosion. *American Society for Naval Engineers, Journal,* v. 67, Nov. 1955, p. 1074-1087.

Application of cathodic protection to the under-water surface of ships' hulls. Graph, diagrams. (R10)

26-R. Exposure Tests on Three Types of Pipe. M. J. Shelton and Bert C. Wilkas. *American Water Works Association, Journal,* v. 47, Nov. 1955, p. 1107-1123.

Soil corrosion tests of asphalt-mastic-coated steel, cast iron and asbestos-cement pipes. Diagrams, photographs, tables, graph. 2 ref. (R8, CI)

27-R. In-Service Corrosion Testing. *Chemical and Engineering News,* v. 33, Nov. 28, 1955, p. 5152-5154.

Changes in electrical resistance with decreasing cross section can be directly related to corrosion. (R11)

28-R. A Note on the Value of Ammonia Treatment for Tank and Casing Annulus Corrosion by Hydrogen Sulfide. Walter F. Rogers. *Corrosion,* v. 11, Nov. 1955, p. 488-490.

Ammonia appears to have little beneficial effect when injected into tank in which steel has been exposed to sulfide vapors. Analogous results predicted from injection of ammonia into the casing-tubing annular space of sulfide producing wells. Graph, tables. 3 ref. (R10)

29-R. The Corrosion Behavior of Aluminum. Hugh P. Godard. *Corrosion,* v. 11, Dec. 1955, p. 542-552.

Practical corrosion behavior of aluminum. Diagram, tables, graphs. 29 ref. (R general, Al)

30-R. Corrosion in the Motor-Car. IV. Bearings and Exhaust Valves. Z. S. Michalewicz. *Corrosion Technology,* v. 2, Nov. 1955, p. 334-338.

Causes and corrosion properties of the main types of bearing metals. High temperature resistant valve steels safeguard against valve corrosion. Graphs, micrographs, photographs, table. 17 ref. (R2, R9, Pb, Cd, Cu, Ag, Al, ST)

31-R. Corrosion Inhibitors in Petroleum Refinery Service. *Corrosion Technology,* v. 2, Nov. 1955, p. 343-347.

General review emphasizing proper applications. Photographs. 10 ref. (R10)

32-R. Corrosion Research Laboratories. VI. Cebelcor—The Belgian Corrosion Research Centre. Alex Pirson. *Corrosion Technology,* v. 2, Nov. 1955, p. 348-354.

Description of the organization and workings of a Belgian corrosion research laboratory. Diagrams. 40 ref. (R general, A9)

33-R. Cathodic Protection Cuts Repairs. J. B. Prime. *Electrical World,* v. 144, Dec. 12, 1955, p. 104-106.

Successful application to structures and equipment in generating plants that use salt water for condensing. Diagrams, photographs. (R10)

34-R. The Effect of Alloying Elements in Iron on Hydrogen Overvoltage and Corrosion Rate in Acid Environments. Milton Stern. *Electrochemical Society, Journal,* v. 102, Dec. 1955, p. 663-668.

Sulfur, phosphorus and carbon proved detrimental to corrosion resistance. Tables, graphs. 9 ref. (R5, Fe)

35-R. Filiform Corrosion. A. Bukowiecki. *Engineers' Digest,* v. 16, Nov. 1955, p. 531-532. (Translated from *Schweizer Archiv,* v. 21, no. 5, May 1955, p. 165-168.)

Previously abstracted from original. See item 278-R, 1955. (R2)

36-R. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 47, Nov. 1955, p. 81A-82A, 84A.

Concentration cell corrosion, its cause and practical evaluation procedures. Photographs, diagram. 1 ref. (R1, R11)

37-R. Studying Corrosion Rates. W. R. Pollard and J. V. Lawson. *Industrial and Engineering Chemistry,* v. 47, Nov. 1955, p. 2282-2283.

A model pilot plant is used for studying corrosion from Chlorex, which is used to separate lubricating stocks into paraffinic and naphthenic fractions. Corrosion coupons used to evaluate alcohols, organic phosphates, mercaptans and amines as inhibitors. Diagram, table, graph. (R11)

38-R. Observations on the Internal Corrosion of Tin-Plate Cans by Acid Foodstuffs. H. Cheftel, J. Monvoisin and Malwina Swirski. *Journal of the Science of Food and Agriculture,* v. 6, Nov. 1955, p. 652-655.

It is shown that the anodic behavior of tin versus iron in the corrosion of tin plate by canned foods is what would be expected on theoretical grounds. With reference to the fact that the hydrogen evolved during the corrosion of tin plate is less than the amount corresponding to the metals dissolved, an electrochemical mechanism is suggested which may account in part for this deficit. Attention is also drawn to previously unsuspected accelerators of corrosion (e.g., caramelization products in fruits.) Tables. 12 ref. (R5, Sn)

39-R. Design Features Affecting Digester Corrosion. L. G. Pfeiffer, M. A. Scheil and E. H. Schmidt. *Tappi,* v. 38, Nov. 1955, p. 652-659.

Circulation systems, supports, internal projections and protection of walls by baffling, surface preparation, stress relief and radiography, field repair. Diagrams, micrographs, photographs. (R7, ST)

40-R. Corrosion of Zirconium and Its Alloys. B. Lustman, editor. Paper from "The Metallurgy of Zirconium". National Nuclear Energy Series, Division VII—v. IV. McGraw-Hill Book Co., p. 553-686.

Theory, behavior and mechanisms in gases, water, chemical solutions and liquid metals. Electrode reactions. Tables, graphs, photograph, micrographs, diagrams. 200 ref. (R general, Zr)

41-R. (French.) **The Dry Oxidation of Iron and Steel.** Lucia de Brouckere and Madeleine Mathys-Solvel. *Industrie Chimique Belge,* v. 20, no. 1, Jan. 1955, p. 35-53.

Studies of iron and of a mild steel exposed to pure air between 200 and 900° C. Micrographs, graphs, tables. 10 ref. (R2, Fe, CN)

42-R. (German.) **Corrosion Bibliography.** *Werkstoffe und Korrosion,* v. 6, 1955 Supplement, p. 618-716.

Gives 775 abstracts in the following classifications: general, theory, measurement; ferrous and nonferrous metals, organic materials, metallic and organic coatings. (R general)

43-R. (Swedish.) **The Effect of the Annealed Layer on Contact Corrosion in Welded Finished Steel.** Tore Norén. *Svetsaren,* v. 20 no. 1, 1955, p. 14-20.

Laboratory investigations on the factors effecting the intensity of the corrosive effect. Graphs, photographs, diagram. (R1, K general, ST)

44-R. (Pamphlet.) **Corrosion in Engine Cooling Systems Containing Aluminum: A Literature Survey.** Mildred Benton, compiler. Bibliography No. 5. 31 p. 1955. Naval Research Laboratory, Washington, D. C.

Bibliography covered the period 1926 to 1955, based on an investigation of other systems using aluminum-containing structures for cooling, and inhibitors used for such systems. (R4, R10, T25, Al)

45-R. (Pamphlet.) **The Corrosion Products of Iron and Steel: A Selected Bibliographic Survey With Abstracts.** Mary Jo Hoehm, compiler. Bibliography No. 3. 24 p. 1955. Naval Research Laboratory, Washington, D. C.

Covers periods from Jan. 1945 to Jan. 1955. (R2, Fe, ST)

46-R. Cathodic Protection Circuits. E. W. Schwarz and R. M. Wainwright. *Applications and Industry,* 1955, no. 21, p. 311-315.

Outlines corrosion problem and advantages and disadvantages of present methods of attack. Purpose and implications of equivalent electric network and how it may be solved for corroding cell; use of

present methods of circuit analysis to establish criterion for cathodic protection. Diagrams. 4 ref. (R10)

47-R. Corrosion in Borated and Deionized Water at Temperatures up to 500° F. Walter K. Boyd and Robert S. Peoples. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* BMI-1047, Oct. 1955, 20 p.

Stainless steels, beryllium and aluminum alloys studied. Photographs, micrographs, tables. (R11, R4, SS, Be, Al)

48-R. Corrosion: How It Affects Materials Selection and Design. Russel W. Henke. *Materials & Methods,* v. 42, Nov. 1955, p. 119-134.

Comprehensive manual covering types and mechanisms of corrosion and designs to reduce corrosion. Photograph, diagrams, charts. 7 ref. (R general)

49-R. Corrosion and the Modern Power Station. Edmond C. Potter. *Research,* v. 8, Dec. 1955, p. 450-455.

Problem and cost of corrosion in steam boilers, with particular reference to the power station industry; research program proposed. Photograph, micrographs, diagram. 5 ref. (R4)

50-R. Stress Corrosion and Relaxation of High Carbon Steel Wire for Prestressed Concrete. Fritz Schwier. *Wire and Wire Products,* v. 30, Dec. 1955, p. 1473-1479, 1519-1521.

Tests and results for both drawn and oil-tempered steels. Photographs, graphs. 3 ref. (R1, CN)

51-R. (Czech.) **Corrosion of Aluminum and Its Alloys.** B. Puchnar. *Strojirenstvi,* v. 5, no. 8, Aug. 1955, p. 605-608.

Intercrystalline, spot and uniform corrosion; effect of various metals and electric current; corrosion caused by inorganic salts, building materials and impregnation preparations; criteria for choice of materials in contact with aluminum parts. Table, diagrams. (R general, Al)

52-R. (French.) **Light Alloys and Prevention of Corrosion.** Jean Hérenguel. *Métaux, corrosion-industries,* v. 30, no. 361, Sept. 1955, p. 315-323.

Corrosion tests on industrial light alloys; influence of heat treatment on corrosion properties; methods of corrosion protection. Graphs, photographs. (R11, J general, EG-a)

53-R. (French.) **Electrochemical and Chemical Factors in Wet Corrosion.** B. Le Boucher. *Métaux, corrosion-industries,* v. 30, no. 361, Sept. 1955, p. 324-339.

Electrochemical nature of corrosion, accelerated tests of corrosion, conditions of test data evaluation. Graphs, diagrams. 10 ref. (R1, R11)

54-R. (French.) **Corrosion Protection of Magnesium Alloys.** Maurice Hardouin. *Métaux, corrosion-industries,* v. 30, no. 361, Sept. 1955, p. 340-346.

Influence of alloying elements on corrosion properties and an evaluation of corrosion protection methods. Graphs. 5 ref. (R10, Mg)

55-R. (German.) **Aeration Cells.** Heribert Grubitsch. *Monatshefte für Chemie,* v. 86, no. 5, Oct. 1955, p. 752-764.

Iron corrosion in a neutral aerated electrolyte solution as a pure diffusion controlled process. Table, graphs, diagram. 37 ref. (R6, R1, Fe)

56-R. Corrosion of Stainless Steels in Supercritical Water. H. A. Pray and W. K. Boyd. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* BMI-901, Feb. 1954, 19 p.

Materials evaluated on basis of weight gain and metallographic examination. Graph, tables, micrographs. (R4, SS)

57-R. Reaction of Nickel in Molten Sodium Hydroxide. Robert S. Peoples, Paul D. Miller and H. Dale Hannan. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* BMI-1041, Sept. 1955, 12 p.

Sodium oxide is shown to be a product of the nickel-sodium hydroxide reaction at 950° C. under either an argon or hydrogen atmosphere. Discussion of its role in the corrosion mechanism. Graph, tables. (R11, R6, Ni)

58-R. Corrosion of Selected Materials in Pentalene 290 and a Mixture of Dowtherm A and Alkylbenzene. Walter K. Boyd and Robert S. Peoples. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* BMI-1046, Oct. 1955, 9 p.

Aluminum 52S and 61S, coupled and uncoupled samples of Armco 17-7PH, type-316 stainless steel, Hastelloy X, Croloy 5, Alfenol(15.5Al), zirconium-5 wt.% tin, Zircoloy 2, and beryllium were tested. Pentalene 290 decomposes rapidly at temperatures of 600° F. and above. Diagram, tables, photographs. (R7)

59-R. Corrosion in Singapore. Problems of Packaging and Storage in the Tropics. P. A. Cartwright. *Corrosion Technology,* v. 2, Nov. 1955, p. 362-365.

Climate, mold growths and insects present adverse conditions for the preservation of materials. Tables. 18 ref. (R3, P10)

60-R. Modern Stainless Steels. *Edgar Allen News,* v. 34, Dec. 1955, p. 278-279.

Corrosion resistance of British "Imperial" and "Maxilvry" stainless steels to various media. Table, photograph. (To be continued.)
(R general, SS)

61-R. Some Aspects of Canning Soft Drinks. H. T. Johnson, A. W. McAlpin and A. M. Schenck. *Food Technology,* v. 9, Dec. 1955, p. 643-647.

Factors adversely affecting shelf life. Development of a "corrosivity tester". Graphs, table. (R11, R7)

62-R. Prevention of Scale and Corrosion in the Water Cooling Systems of Internal Combustion Engines. E. L. Streatfield. *Gas and Oil Power, (Annual Technical Review Number),* v. 50, 1955, p. 315, 316, 319.

Conclusions on the process and distribution of corrosion. Particular attention given to under-water corrosion, with sodium benzoate as an inhibitor. 12 ref. (R4)

63-R. Adapting the Static Water Drop Test to Research Methods. E. J. Schwoegler and L. U. Berman. *Lubrication Engineering,* v. 11, Nov. Dec. 1955, p. 381-388.

Presents in detail method of preparing specimens so that a shorter test period of 48 hr. can be used with duplicate samples. Test results are quite precise and accurate. More rapid tests are thus possible so that a large number of polar organic compounds may be evaluated in the search for optimum corrosion inhibition. Tables, photographs. 2 ref. (R11, R10, ST)

64-R. The Life of Ball and Roller Bearings. R. H. Warring. *Machinery Lloyd (Overseas Ed.),* v. 27, Dec. 3, 1955, p. 69, 71, 72.

Various factors of failure with particular attention to fretting corrosion. An empirical formula to determine expectant life is presented. Table. (R1)

65-R. Corrosion and Materials in the Water Works Field. R. W. Henke. *Water & Sewage Works,* v. 102, Dec. 1955, p. 508-510.

Several factors involved in metallic corrosion given as a guide to combatting the condition. Diagrams, table. (R1, R4)

66-R. (English.) Selective Oxidation of Silver-Magnesium Alloys in Water Vapor. Masaki Hirashima. *Physical Society of Japan, Journal,* v. 10, no. 12, Dec. 1955, p. 1055-1064.

Simple method for measuring low rates of oxidation at elevated temperatures with water vapor used as oxidizing agent. It is found that the MgO layer builds up on the surface of the alloy according to a parabolic law, and the oxide growth begins to follow a linear law rather than a parabolic law at a pressure of 1 mm.Hg. Diagrams, micrographs, graphs, table. 22 ref. (R2, Ag, Mg)

67-R. (German.) Influence of Optical Whitening Agents on the Corrosion of Copper. O. Uhl. *Fette, Seifen, Anstrichmittel,* v. 57, no. 10, Oct. 1955, p. 793-797.

Shows no increased corrosion in the presence of optical whitening agents even with subsequent chlorine-bleaching, and treatment with thiosulfate. Tables, graphs, photographs. (R5, R7, Cu)

68-R. Attack on Materials by Lead at 1000° C. W. D. Wilkinson, E. W. Hoyt and H. V. Rhude. *Argonne National Laboratory (U. S. Atomic Energy Commission),* ANL-5449, Oct. 1955, 30 p.

Static tests carried out on a method for determining the resistance of materials to attack by lead at 1000° C. Tables, micrographs, diagrams. 5 ref.

(R6, Ta, Cb, ST, Ni, U, Mo, Zr, Ti)

69-R. Induced Alternating Current Used for Cathodic Protection of a Coated Pipe Line. S. J. Bellassai. *Corrosion,* v. 12, Jan. 1956, p. 17-19.

A 5-amp., 15-volt selenium stack, 10 3-in. × 60-in. graphite rods, and 500 ft. of 1/0 copper cable provided circuit resistance of the required value to cathodically protect a coated pipe line. 1 ref. (R10)

70-R. Nomograph for Corrosion Rate Calculations. Henry K. Bass, Jr., and Robert V. Andrews. *Corrosion,* v. 12, Jan. 1956, p. 20-21.

Means for determining corrosion rate in mils per year. Nomograph. 5 ref. (R11)

71-R. High Temperature Hydrogen Sulfide Corrosion. E. B. Backensto, R. D. Drew and C. C. Stapleford. *Corrosion,* v. 12, Jan. 1956, p. 22-30; disc., p. 30-32.

Proposed methods for minimizing corrosion include reduction of hydrogen sulfide in process streams, use of chromium-nickel alloys, protection of metals by aluminum coating. Micrographs, tables photographs, graphs. 3 ref. (R5, L15)

72-R. Correlation of the Results Obtained With Corrosion Inhibitors in the Laboratory and in the Field. G. E. Purdy and William J. Ries. *Corrosion,* v. 12, Jan. 1956, p. 33-37; disc., p. 37-38.

Factors influencing internal cor-

rosion in oil wells. Field and laboratory tests with three crude oil and brine systems using two organic inhibitors were correlated. Diagram, graphs, tables. 10 ref. (R10, R11)

73-R. Inhibition of Metallic Corrosion in Aqueous Media. Harry C. Gatos. *Corrosion,* v. 12, Jan. 1956, p. 39-48.

Corrosion processes from an electrochemical standpoint and organic and inorganic inhibitors. Tables, diagrams, graphs. 100 ref. (R10)

74-R. Investigation of an Unusual Cause of Shipbottom Pitting. R. P. Devoluy. *Corrosion,* v. 12, Jan. 1956, p. 49-54.

For severe corrosion to occur, the antifouling paint must be in contact with the steel hull, and the painted surface must be exposed to sulfide forming or sulfide bearing waters. Photographs, tables. (R4, R2, L26)

75-R. Corrosion of Gasoline Engine Exhaust Valve Steels. C. H. Allen and M. J. Tauschek. *Corrosion,* v. 12, Jan. 1956, p. 55-59; disc., p. 59-62.

Method for evaluating corrosion resistance, effect of analysis variation in various alloy steels as it influences corrosion, influence of silicon on corrosion, effect of a variation in nickel-iron content on aircraft valves, use of valve rotators in reducing valve corrosion. Graphs, photographs, tables. (R9, ST)

76-R. Final Report on Four Annual Anode Inspections. *Corrosion,* v. 12, Jan. 1956, p. 63-74.

Data obtained from four test ground beds concerning the performance of steel, and carbon and graphite anodes in natural soils, and in carbonaceous backfill. Graphite anodes in a carbonaceous backfill gave best results. Tables, graphs. (R10)

77-R. Progress Report of Task Group T-4F-1 on Water Meter Corrosion. *Corrosion,* v. 12, Jan. 1956, p. 77-80.

Identifies manner in which corrosion effects individual parts and factors contributing to corrosion. Micrographs, diagram. (R4)

78-R. Corrosion Studies Aid Light Metals. Frederick W. Fink. *Corrosion Technology,* v. 2, Dec. 1955, p. 372-374.

Factors which have made aluminum, magnesium and titanium of greater industrial importance. Graphs. (R general, Al, Mg, Ti)

79-R. Salt Spray Testing. G. B. Hogaboom, Jr. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 496-499.

Typically used specifications for salt spray testing. (R11)

80-R. Corrosion of Metals. S. C. Britton. Paper from "Reports on the Progress of Applied Chemistry". v. XXXIX. Society of Chemical Industry, p. 105-116.

High temperature, atmospheric, in water and underground, agents and resistant materials, inhibitors, protective coatings, cathodic protection. 118 ref. (R general)

81-R. (German.) **Chemical Behavior of Aluminum Materials.** *Aluminium Ranshofen, Mitteilungen,* v. 3, no. 2, Oct. 1955, p. 31-34.

Effect of surface conditions on corrosion protection, types of corrosion, solubility potential, corrosion under influence of different gaseous media. Tables. (To be continued.) (R9, R2, R10, Al)

82-R. (Russian.) **Mechanism of Oxygen Transfer Through Thin Electrolyte Layers.** *Doklady akademii nauk SSSR,* v. 104, no. 6, Oct. 21, 1955, p. 876-879.

Proves, by experiments, that usually irregular evaporation of electrolyte from the metal surface facilitates stirring of thin electrolyte layers. This fact results in decreasing diffusion layer thickness and in increasing oxygen supply to the metal surface. Tables, graphs. 14 ref. (R2)

83-R. (Book.) **Corrosion in Action.** 47 p. 1955. International Nickel Company, Inc., 67 Wall St., New York 5, N. Y.

Nature of corrosion, anode and cathode processes, origin and characteristics of corrosion currents, and passivity and protective films. (R general)

84-R. (English.) **Low-Alloy Steels Resistant to Stress-Corrosion Cracking.** *Aciers fins & spéciaux francais,* no. 21, Nov. 1955, p. 29-32.

Applications for chromium-aluminum corrosion resistant steels. Micrographs. (R1, SS)

85-R. (French.) **Investigation of Fe_3O_4 Precipitation in Superficial Iron Oxide Films at Elevated Temperatures.** J. Paidassi. *Revue de métallurgie,* v. 52, no. 11, Nov. 1955, p. 869-886.

Relates FeO formation and Fe_3O_4 precipitation to temperature changes and heat treatments. Diagrams, micrographs, graphs. 16 ref. (R2, N7, ST)

86-R. (German.) **Corrosion and Corrosion Protection on Power-Plant**

Equipment. II. B. Müller. *Energietechnik,* v. 5, no. 10, Oct. 1955, p. 444-451.

Types of corrosion phenomena on power equipment, turbines and related apparatus and use of cathodic protection. Diagrams, graphs, tables. 6 ref. (R10)

87-R. (German.) **Composition of the Scale Forming on Hot Rolled Strips and Sheets.** Walter Fackert. *Stahl und Eisen,* v. 75, no. 25, Dec. 15. 1955, p. 1705-1710.

Factors and variables involved in formation of scale on steel. Describes device for recording the dissolution lines of scale and its use in determining the scale structure of six hot rolled strip sections of different origin. Graphs, micrograph, diagram. 9 ref. (R2, F23, ST)

88-R. (German.) **Cathodic Corrosion Prevention.** F. Ritter. *Werkstoffe und Korrosion,* v. 6, no. 11, Nov. 1955, p. 523-527.

Protection of metals by using a negative potential flow in the oxidizing medium. Diagrams, photographs. 1 ref. (R10)

89-R. (Italian.) **Problem of the Protection of Methane Pipes Against Electrolytic Corrosion. III.** G. Bianchi. *Rivista dei combustibili,* v. 9, no. 10, Oct. 1955, p. 789-824.

Evaluates effective protection of an underground structure. Grounding measurements as a criterion of protection. Diagrams, graphs, table. (R10, R11)

90-R. (Russian.) **Oxidation of Bi_2Se_3 and Bi_2Te_3 Specimens During Heating in Air.** S. A. Semiletov and Z. G. Pinsker. *Zhurnal tekhnicheskoi fiziki,* v. 25, no. 13, Nov. 1955, p. 2336-2338.

Electronographic study of structure of thin layers formed by sublimation. Table. 2 ref. (R2, Bi, Te)

91-R. How to Reduce Hydrogen Attack. Gordon R. King. *Petroleum Refiner,* v. 35, Jan. 1956, p. 124-128.

Although hydrogen attack in the oil industry cannot as yet be eliminated, it can be reduced. Locally, concrete protective liners seem most economical. Generally, water washing and air injection methods have proved effective. Diagram, graph, photographs. 32 ref. (R9, ST)

92-R. What Happens in H_2-H_2S Corrosion. E. B. Backensto, Robert D. Drew and Carvel C. Stapleford. *Petroleum Refiner,* v. 35, Jan. 1956, p. 147-150; disc., p. 150-151.

Corrosion data on steel, low-chromium alloy and chromium-nickel alloy in hydrogen-hydrogen sulfide atmospheres at high temperatures. Use of chromium-nickel stainless steels, reduction of hydrogen sulfide concentration in environment, protection of metal surfaces by coating with aluminum aid in minimizing corrosion. Graphs, micrographs, tables, photograph. 3 ref. (R9, ST)

93-R. How Can We Prevent Steam Turbine Erosion and Corrosion? F. H. Pennell. *Power Engineering,* v. 60, Jan. 1956, p. 100-101.

Better resistance to corrosion and erosion may be effected by design improvements and by improving the surface of the blade. Diagrams, photographs. (R4)

94-R. Resistance of Materials to Mechanical Corrosion. Russell W. Henke. *Product Engineering,* v. 27, Jan. 1956, p. 194-197.

Causes of stress-corrosion, corrosion fatigue, impingement erosion and fretting. Guides to choice of the most resistant materials and remedies possible in design. Photographs. (R1, Cu, Al, Fe, Ni, AY)

95-R. Structure of Oxides Formed on High-Temperature Alloys at 1500° F. John F. Radavich. Paper from "Symposium on Basic Effects of Environment on the Strength, Scaling, and Embrittlement of Metals at High Temperatures". ASTM Special Technical Publication No. 171, p. 14-31; disc., p. 32-34.

Study of the oxide structures formed on various alloys by means of electron microscopy and electron and X-ray diffraction. Tables, micrographs. 13 ref. (R2, M21, M22, SG-h)

96-R. Effect of Strain on the Oxidation of Nickel-Chromium Heater Alloys. Earl A. Gulbransen and Kenneth F. Andrew. Paper from "Symposium on Basic Effects of Environment on the Strength, Scaling, and Embrittlement of Metals At High Temperatures". ASTM Special Technical Publication No. 171, p. 35-46; disc., p. 47-48.

New test method by which a metal is oxidized a given amount, strained 1 to 4% and then reoxidized. Rates of oxidation before and after strain measured. Graphs, tables. (R2, SG-h)

97-R. An Investigation of Intergranular Oxidation in Type 310 Stainless Steel. R. E. Keith, C. A. Siebert and M. J. Sinnott. Paper from "Symposium on Basic Effects of Environment on the Strength, Scaling, and Embrittlement of Metals at High Tem-

peratures". ASTM Special Technical Publication No. 171, p. 49-60; disc., p. 60-64.

Establishes effect of time and temperature on intergranular oxide penetration and determines whether appreciable differences in composition exist between the intergranular oxides and the external scales. Graphs, diagrams, micrographs, tables. 19 ref. (R2, SS)

98-R. The Properties of Oxidation-Resistant Scales Formed on Molybdenum-Base Alloys at Elevated Temperatures. M. Gleiser, W. L. Larsen, R. Speiser and J. W. Spretnak. Paper from "Symposium on Basic Effects of Environment on the Strength, Scaling, and Embrittlement of Metals at High Temperatures". ASTM Special Technical Publication No. 171, p. 65-86; disc., p. 87-88.

Various molybdates and molybdenum-containing oxide complexes were tested for stability at elevated temperatures to determine if they would be stable at operating temperatures and possibly present a barrier to further oxidation. Graphs, tables. 24 ref. (R2, Mo)

99-R. Oxidation at Elevated Temperatures. John F. Radavich. Paper from "Symposium on Basic Effects of Environment on the Strength, Scaling, and Embrittlement of Metals at High Temperatures". ASTM Special Technical Publication No. 171, p. 89-113; disc., p. 113-114.

Various techniques used and results of oxidation of seven high-temperature alloys. Micrographs, tables, graphs. 10 ref. (R2, SS, SG-h)

100-R. Mechanism of Corrosion of Iron by Sulfur. P. V. Gel'd and O. A. Esin. *Henry Brutcher Translation No.* 3186, 10 p. (From *Zhurnal prikladnoi khimii,* v. 19, no. 7, 1946, p. 677-683.) Henry Brutcher, Altadena, Calif.

Present theories reviewed; concludes that sulfide corrosion of iron is due to defects in iron-sulfur system phases. Graphs. 14 ref. (R1, Fe, S)

101-R. Method for Corrosion-Fatigue Testing. L. A. Glikman and L. A. Suprun. *Henry Brutcher Translation No.* 3608, 6 p. (From *Zavodskaya laboratoriya,* v. 21, no. 4, 1955, p. 464-466.) Henry Brutcher, Altadena, Calif.

Structural steel and gray iron tested in air, river water and 3% salt solution by a machine operating the unused specimen at 2860 r.p.m. Table, graphs, diagrams. 4 ref. (R1, R3, R4, CI, CN)

102-R. (German.) **Chemical Stability of Molybdenum Disilicide as a Construction Material.** E. Fitzer and J. Schwab. *Metall,* v. 9, nos. 23-24, Dec. 1955, p. 1062-1066.

Properties and behavior at high temperatures; attack by various molten metals. Micrographs, graphs, tables, photographs. 16 ref. (R6, Mo)

103-R. (Russian.) **Interaction of Metals With Sulfur Dioxide.** E. I. Danilova and G. S. Frents. *Izvestiia akademii nauk SSSR, otdelenie tekhnicheskikh nauk,* no. 11, Nov. 1955, p. 25-33.

Phase composition changes of the reaction products of zinc, copper, lead and cadmium in relation to temperature and pressure of sulfur dioxide. Graphs, tables. 6 ref. (R9, P12, Zn, Pb, Cu, Cd)

104-R. Compositional Factors Affecting Corrosion Resistance of Zirconium in High-Temperature Water and Steam. Walter K. Boyd, Daniel J. Maykuth, Robert S. Peoples and Robert I. Jaffee. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* BMI-1056, Nov. 1955, 90 p.

Studies to correlate the composition and structure of a number of sponge zirconium alloys with their corrosion resistance. Effects of varying amounts of carbon, gaseous impurities and alloying constituents. A new technique was utilized for melting small ingots in an attempt to obtain reliable and reproducible results. Diagram, graphs, micrographs, tables. 9 ref. (R4, Zr)

105-R. The Problem of Corrosion in Petroleum Refining. I. E. J. M. Tait. *Corrosion Prevention and Control,* v. 2, Dec. 1955, p. 25-30, 44.

Nature of and an approach to solving the external and internal corrosion. (To be continued.) (R7)

106-R. Further Studies on the Anodic Corrosion of Lead in H_2SO_4 Solutions. J. J. Lander. *Electrochemical Society, Journal,* v. 103, Jan. 1956, p. 1-8.

Interprets the thermodynamics and kinetics of the corrosion process in order to indicate means of preventing or slowing down corrosion, thus allowing longer positive grid life. Tables, graphs, diagram. 12 ref. (R5, Pb)

107-R. Mathematical Studies on Galvanic Corrosion. IV. Influence of Electrolyte Thickness on the Potential and Current Distributions Over Coplanar Electrodes Using Polarization Parameters. James T. Waber and Bertha Fagan. *Electrochemical Society, Journal,* v. 103, Jan. 1956, p. 64-72.

Evaluation of Fourier series to show influences of liquid depth and polarization parameter. Diagram, graphs. 14 ref. (R1)

108-R. Electrochemical Corrosion in Nearly Neutral Liquids. U. R. Evans. *Electrochemical Society, Journal,* v. 103, Jan. 1956, p. 73-85.

Report on years of study of corrosion mechanism. Considers general corrosion, pitting and immunity. Diagrams, graphs, table. 71 ref. (R1)

109-R. High Pressure Loop Design for Studies of Reactions Between Heated Metals and High Temperature Water. D. C. Kaulitz and J. E. Minor. *Hanford Atomic Products Operation (U. S. Atomic Energy Commission),* HW-38876, Sept. 1955, p. 3-21.

Equipment which permits heated metals to be contacted by a rapid flow of high-temperature water. Water temperatures and pressures up to 300° C. and 2000 psi. and specimen temperatures up to 800° C. are utilized. Diagrams, photographs, graphs. (R11, R4)

110-R. Corrosion of Iron in High-Temperature Water. I. Corrosion Rates by Hydrogen Evolution at 240 to 36° C. II. Kirkendall Experiments. D. L. Douglas and F. C. Zyzes. *Knolls Atomic Power Laboratory (U. S. Atomic Energy Commission),* KAPL-1376, Nov. 1955, 93 p.

Effects of surface finish, temperature and heat treatment; measurements were made in saturated vapor, superheated vapor and certain dilute aqueous solutions. The ion species diffusing through a magnetite film formed on corrosion of iron in high-temperature water were identified by Kirkendall-type experiments. Diagrams, graphs, micrographs, photographs, tables. 45 ref. (R4, Fe)

111-R. Characteristics and Prevention of Fretting Corrosion. R. B. Waterhouse. *Machine Design,* v. 28, Jan. 26, 1956, p. 104, 106, 108.

General considerations of the damaging results and preventive measures. (R1)

112-R. Effect of Temperature and Pressure on Steam Testing of Zirconium Alloys. D. S. Kneppel. *Nuclear Metals, Incorporated (U. S. Atomic Energy Commission),* NMI-1119, Oct. 1954, 45 p.

A study was carried out on a group of ten experimental alloys. Data obtained were plotted on log-log paper. Unalloyed sponge, crystal bar zirconium and Zircaloy-2 were also tested. Graphs, tables. (R4, Zr)

113-R. Oxidation Rates of Molten Metals as Determined by a Recording Thermobalance. I. Tin. J. H. Bilbrey, Jr., D. A. Wilson and M. J. Spendlove. *U. S. Bureau of Mines, Report of Investigations* 5181, Dec. 1955, 24 p.

Rates of oxidation of molten tin over temperature range 550 to 900° C., as determined by recording thermobalance, were found to vary widely for a given temperature. X-ray diffraction data indicated that probable cause of variations was the development of preferred orientations in crystals forming the oxide film. Photographs, diagrams, graphs, tables. 32 ref. (R2, Sn)

114-R. (German.) **A Contribution Relating to the Execution of Corrosion Tests.** Luigi Riccoboni, Paolo Papoff and Ida Maria Vezzosi. *Werkstoffe und Korrosion,* v. 6, no. 12, Dec. 1955, p. 569-571.

Description of test apparatus for determining corrosion-time relationships of a specimen in a constant amount of electrolyte and in absence of a gas phase. A polarographic control is used. Diagram. 16 ref. (R11)

115-R. (Japanese.) **A Study on Cathodic Protection of Mild Steel in Acid Solutions.** Hayata Shigeno and Toyoji Kobayashi. *Government Chemical Industrial Research Institute, Tokyo, Reports,* v. 50, no. 11, Nov. 1955, p. 361-366.

Results of experiments regarding the influence of applied cathodic current on the electrochemical behavior of mild steel and its protecting effect in sulfuric acid solutions, mine water and sulfuric acid solutions containing copper ions. Graphs, diagram, table. 5 ref. (R10, ST)

116-R. (Russian.) **Prevention of Steam Corrosion of Boiler Pipes.** D. L. Drakhman. *Energetik,* v. 3, no. 12, Dec. 1955, p. 11.

Measures include installation of special inner core-pipes within the boiler pipes. Diagram. 1 ref. (R4)

117-R. (Russian.) **Methods of Testing Stainless Steels for Their Tendency to Intercrystalline Corrosion.** *Zavodskaia laboratoriia,* v. 21, no. 11, 1955, p. 1314-1345.

Zonal peculiarities resulting from welding, corrosion media, basic reasons for tendency to corrosion, microstructural peculiarities, distribution of ferrite and austenite grains. Graphs, micrographs, diagrams, tables. 68 ref. (R2, R11, M27, SS)

118-R. (Russian.) **Methods of Studying the Corrosion of Metals at Contact Interfaces.** I. L. Rozenfel'd and I. K. Marshakov. *Zavodskaia laboratoriia,* v. 21, no. 11, 1955, p. 1346-1353.

Peculiarities of corrosion along contacts of varying tightness between metal and porcelain, glass, bakelite or other metals. Relation of total corrosion losses, intensity of corrosion and area affected to the size of the interspace in acid electrolytes of varying strength. Graphs, diagrams. 9 ref. (R11, SS, CN, Al)

119-R. (Russian.) **Installation for Studying the Anticorrosion Potential of Metal in Soil.** N. D. Tomashov and Iu. N. Mikhailovskii. *Zavodskaia laboratoriia,* v. 21, no. 11, 1955, p. 1380-1382.

Circuit of installation for stabilization of electrode potential in soil during cathodic polarization. Change in cathodic current density with time during polarization of cast iron electrode in soil. Effect of moisture of soil on corrosion rate. Circuit diagram, graph, table. (R8, R10, CI)

120-R. (Book.) **Corrosion and Protection Against Corrosion.** *Korrosion und Korrosionsschutz.* Fritz Tödt. 1102 p. 1955. Walter de Gruyter & Co., Berlin, Germany. DM. 168.

General, intercrystalline and stress corrosion; corrosion of different metals; industrial problems; testing methods. (R general)

121-R. Corrosion Problems in Small Heating Boilers. H. F. Hinst. *American Water Works Association, Journal,* v. 48, Jan. 1956, p. 11-18.

Causes and prevention of corrosion in low-pressure heating boilers. Graphs, photographs, micrographs. (R4)

122-R. Corrosion of Brass by Chloramine. T. E. Larson, R. M. King and L. Henley. *American Water Works Association, Journal,* v. 48, Jan. 1956, p. 84-90.

Faucet seats of Monel metal or electrolytically silver-plated brass gave good service, resisting corrosion by chloramine in the water supply. Tables. 5 ref. (R4, Cu, Ni)

123-R. Sulphur Dew-Point Corrosion in Exhaust Gases. R. L. Coit. *ASME, Transactions,* v. 78, Jan. 1956, p. 89-94.

Corrosion can be limited by using corrosion-resistant alloys, using low-sulfur fuels, and by keeping surface temperatures above the acid-water dew point. No available coating materials adequately protect heat exchanger surfaces or compressor blades at low temperatures. Diagram, graphs, photographs, tables. 7 ref. (R9, SG-g)

124-R. Corrosion of Thorium and Thorium Binary Alloys in Distilled Water at 100 and 200° C. W. E. Berry, H. A. Pray and R. S. Peoples. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* BMI-951, Sept. 29, 1954, 17 p.

Study to determine if alloy additions might improve the corrosion resistance of thorium in distilled water. Unalloyed Ames thorium possessed excellent corrosion resistance in boiling distilled water. Thorium alloyed with zirconium was equally resistant. Graphs, tables. 15 ref. (R4, Th)

125-R. Corrosion Work by British Railways Research Department. W. J. Hair. *Corrosion Technology,* v. 3, Jan. 1956, p. 8-11.

How some of the problems of corrosion which constantly confront the railways are dealt with. Photographs. (R3)

126-R. Economic Cathodic Protection. Benson G. Brand. *Corrosion Technology,* v. 3, Jan. 1956, p. 12-14.

Use of organic coatings in conjunction with cathodic protection is presented as an effective and economical method of preventing corrosion. Photograph. (R10, L26)

127-R. The Mechanism of the Inhibition of Corrosion by the Pertechnetate Ion. II. The Reversibility of the Inhibiting Mechanism. III. Studies on the Perrhenate Ion. G. H. Cartledge. *Journal of Physical Chemistry,* v. 60, Jan. 1956, p. 28-36.

Inhibited state is labile with respect to concentrations of pertechnetate ion and other constituents of the solution. Perrhenate ion differs radically from pertechnetate ion in its effect on corrosion. Graphs, diagram. 39 ref. (R10, Fe, Tc, Re)

128-R. Mass Transfer of Foreign Elements From Zirconium During High-Temperature Water Corrosion. L. M. Litz, S. A. Ring, W. R. Balkwell and R. D. Nethaway. *Livermore Research Laboratory (U. S. Atomic Energy Commission),* LRL-76, Jan. 1954, 19 p.

Mass transfer of niobium, zirconium, yttrium, strontium, rubidium, selenium, arsenic and germanium from zirconium metal foils was followed during water corrosion of the zirconium at 264, 280 and 300° C. using radio-active tracers of these elements. Diagram, graphs, tables. 1 ref. (R4, Zr)

129-R. Corrosion Resistance of Aluminum Alloys. *National Bureau of Standards, Technical News Bulletin,* v. 40, Jan. 1956, p. 13-15.

Report on 20-year exposure tests in inland and marine atmospheres

with various aluminum alloys and protective coatings for the alloys. Photographs, table, graph. 1 ref. (R3, L general, Al)

130-R. (French.) **Practical Aspects of the Fight Against Corrosion.** Strebelle and Stassin. *Centre Belge d'Etude et de Documentation des Eaux, Bulletin mensuel,* nos. 59-60, Nov.-Dec. 1955, p. 292-299.

Investigates corrosion of traveling gantry cranes, and the explosion of a drying machine, in a sugar refinery, due to corrosion. Photographs, micrographs. (R general)

131-R. (Russian.) **Passivation Rate and Potential of Alloy Kh28T3 in Solutions of Sulfuric Acid.** E. I. Litvinova. *Zhurnal prikladnoi khimii,* v. 28, no. 12, Dec. 1955, p. 1285-1290.

Passivation is characterized by chemical stability and remains true with chlorine and copper ions present. Role of titanium, and its effect on action of oxygen, and of smoothness of finish in spontaneous passivation. Effect of solution concentration on passivation rate. Graphs, diagram. 17 ref. (R10, AY)

132-R. (Russian.) **Classification of Corrosion Inhibitors for Metals.** I. N. Putilova and L. G. Gindin. *Zhurnal prikladnoi Khimii,* v. 28, no. 12, Dec. 1955, p. 1298-1301.

Inhibitors, immunizers, passivators and their effect on corrosion processes. Graphs, table. 13 ref. (R10)

133-R. (Russian.) **Problems of Investigating Corrosion of Sintered Iron Products.** I. V. Krotov. *Zhurnal prikladnoi khimii,* v. 28, no. 12, Dec. 1955, p. 1302-1307.

Corrosion testing difficulties caused by nonhomogeneity and porosity. Quantitative determination of rust by cathodic removal in a 2% solution of sulfuric acid. Diagrams. 4 ref. (R11, Fe)

134-R. Heat Transfer and Corrosion Tests for a Sodium-Cooled Fast Breeder Reactor. R. H. Jones and R. E. Lee. *Brookhaven National Laboratory, Division of Engineering (U. S. Atomic Energy Commission),* BNL-2446, Dec. 1955, p. 156-167.

Testing of fuel cladding materials in the form of thin-walled tubing. Diagrams, graph, micrographs, photograph, table. (R6, Na)

135-R. Corrosion Control in Oil and Gas Producing Equipment. J. L. Gattenmeyer, F. W. Hewes and W. H. Seager. *Canadian Mining and Metallurgical Bulletin,* v. 49, no. 525, Jan. 1956, p. 31-36.

Reviews occurrence of corrosion in gas and oil equipment, describes mechanism of corrosion. Methods for preventing, detecting and mitigating corrosion. Diagrams, photograph, table. (R7, R10)

136-R. Selective Corrosion of Delta Ferrite in Cast Stainless Steel. J. M. Bialosky. *Corrosion,* v. 12, Feb. 1956, p. 59.

Reports localized corrosion of delta ferrite formed at high temperature in cast stainless steel. Table, photograph, micrograph. (R7, SS)

137-R. A Study of Protective Criteria on a Pipe Section in a Uniform Environment. L. P. Sudrabin. *Corrosion,* v. 12, Feb. 1956, p. 60-66.

Effect of the reference electrode location upon the meaning of the pipe to reference electrode potential demonstrated by use of a model pipe section. Known anodic areas of representative shape and position are established on iron pipe by coupling high-purity zinc plates through measuring circuits. Diagrams, tables, graph. 16 ref. (R10, Fe, Zn)

138-R. Internal Casing Corrosion in Sour Oil Wells. J. A. Caldwell and M. L. Lytle. *Corrosion,* v. 12, Feb. 1956, p. 67-70.

Indicates need for low-cost method of reducing internal casing corrosion. Results of laboratory and field tests of paraffin-oil and oil-inhibitor mixtures. Tables, diagrams. (R7)

139-R. The Determination of the Effect of a New Grass Killer on Application Equipment. J. A. Kelly, W. J. Falkenstein and J. P. Carr. *Corrosion,* v. 12, Feb. 1956, p. 79-83.

Laboratory tests have been conducted to determine the possible corrosive effect of aqueous solutions of Dalapon sodium salt (sodium 2,2-dichloropropionate) on the metals present in typical agricultural field sprayers. Tables, photographs. 4 ref. (R5)

140-R. The Conductometric Method Applied to the High Temperature Oxidation of Iron. George C. Fryburg. *Corrosion,* v. 12, Feb. 1956, p. 84-86.

The conductometric method is used to study the oxidation of pure iron in the region of 600° C. Iron ribbons of known thickness were used in the tests and the conductance of the central portion of the specimens measured by the potentiometer method. A constant current of 50 milliamp., small enough to prevent heating even in vacuum, was used. An analytical method of measuring the amount of unoxidized iron

remaining in specimens is described briefly. Graph, tables. 8 ref. (R2, Fe)

141-R. Corrosion of Stainless Steel in Ferric Chloride Solution. H. A. Liebhafsky and A. E. Newkirk. *Corrosion,* v. 12, Feb. 1956, p. 92-98.

Induction - period experiments, done with the aid of a microbalance, show that corrosion begins within one minute after a clean dry coupon is immersed in ferric chloride solution. It has been demonstrated that measurements of corrosion rate in this system are simple and relatively reproducible. Extension of these measurements should yield valuable fundamental information about this corrosion process. Tables, graphs, diagrams, radiographs. 1 ref. (R5, R11, SS)

142-R. The Influence of Nitrogen-Containing Organic Inhibitors on the Electrode Potential of Steel in Sulfuric Acid. R. N. Ride. *Electrochemical Society, Journal,* v. 103, Feb. 1956, p. 98-107.

Corrosion inhibition studied by observing electrode potentials and corrosion rates for 13 organic compounds. A revised theory of inhibition proposed. Diagram, graphs. 35 ref. (R5, R10, ST)

143-R. Oxidation of Tungsten. Watt W. Webb, John T. Norton and Carl Wagner. *Electrochemical Society, Journal,* v 103, Feb. 1956, p. 107-111.

Investigation in the 700 to 1000° C. range, covering wide time span, shows that oxidation initially follows the parabolic rate law, eventually changing to the linear. An over-all rate equation is calculated. Micrographs, table, graphs. 20 ref. (R2, W)

144-R. Oxidation Studies in Metal-Carbon Systems. Watt W. Webb, John T. Norton and Carl Wagner. *Electrochemical Society, Journal,* v. 103, Feb. 1956, p. 112-117.

General analysis of oxidation characteristics of alloys containing carbon or carbides. Data on nickel, tungsten, manganese, and titanium-carbon systems. Graphs. 21 ref. (R2, Ni, W, Mn, Ti)

145-R. Thermodynamics of the Oxidation of Chromium. J. N. Ramsey, D. Caplan and A. A. Burr. *Electrochemical Society, Journal,* v. 103, Feb. 1956, p. 135-138.

Microbalance technique used to determine dissociation pressure of chromium oxide over 598 to 1154° C. temperature range. Free energy and enthalpy of oxide formation are calculated. Graph, tables, diagram. 27 ref. (R2, P12, Cr)

146-R. Mathematical Studies on Galvanic Corrosion. V. Calculation of the Average Value of the Corrosion Current Parameter. J. T. Waber, John Morrissey and John Ruth. *Electrochemical Society, Journal,* v. 103, Feb. 1956, p. 138-147.

Mathematical analysis of mean current density for one general and two limiting ratios of electrode and corrodent dimensions, the electrodes consisting of long strips arranged alternately in a common plane. Graphs. 9 ref. (R1)

147-R. Corrosion and Cathodic Protection in Kuwait. J. S. Gerrard. *Institution of Electrical Engineers, Journal,* v. 2, Jan. 1956, p. 2-6.

Principles and methods of cathodic protection against corrosion and measures taken to protect oil installations. Diagrams, photographs, graph. (R7, R10)

148-R. Corrosion of Iron by Oxygen-Contaminated Sodium. G. W. Horsley. *Iron and Steel Institute, Journal,* v. 182, Jan. 1956, p. 43-48.

Study of the interaction of iron with oxygen-contaminated sodium suggests that the corrosion associated with the presence of oxygen in sodium is caused by the formation of a stable double oxide (Na_2O_3). FeO. Tables, micrographs, diagram, X-ray powder photographs. 5 ref. (R6, Fe)

149-R. The Stress-Corrosion Cracking of Austenitic Stainless Steels. I. Mechanism of the Process in Hot Magnesium Chloride Solutions. T. P. Hoar and J. G. Hines. *Iron and Steel Institute, Journal,* v. 182, Feb. 1956, p. 124-143.

Several types of stainless steel wires based on 18% chromium, 8% nickel, stressed in tension, were exposed to 42% aqueous magnesium chloride solution at 135 to 154° C. Corrosion potential and extension were measured. Diagrams, micrographs, tables, graphs. 33 ref. (R1, R5, SS)

150-R. Effects of Sulphate-Chloride Mixtures in Fuel-Ash Corrosion of Steels and High-Nickel Alloys. H. T. Shirley. *Iron and Steel Institute, Journal,* v. 182, Feb. 1956, p. 144-153.

Effect of composition and temperature on various heat resisting materials studied for a range of alkali and calcium sulfate-chloride mixtures. Micrographic characteristics of the attack. Photograph, micrographs, tables. 5 ref. (R6, ST, Ni)

151-R. Cathodic Tank Protection—5 Years Later. R. D. Yingling. *Oil*

and Gas Journal, v. 54, Feb. 20, 1956, p. 113-114.

Construction, operating details, experience with anode installation on tanks handling corrosive brines. Diagrams, photographs. (R10)

152-R. Return Lines Failing? Identify the Cause Before Prescribing Treatment. Joseph R. Coursault. *Power Engineering,* v. 60, Feb. 1956, p. 66-67.

Illustrates characteristic types of corrosion, in return lines of boiler systems, due to oxygen and carbon dioxide. Photographs, graph. (R4)

153-R. (Italian.) **Interpretation of the Operation of Inhibitors in the Vapor Pnase by Observing Their Behavior at Various Temperatures.** C. Bighi and G. Mantovani. *Metallurgia Italiana,* v. 47, no. 11, Nov. 1955, p. 505-510.

Tests of action of various inhibitors against corrosion by sulfuric dioxide. Photographs. 28 ref. (R10)

154-R. (Norwegian.) **Cavitation.** Ingvar Eggestad and Carsten D. Lovstad. *Teknisk ukeblad,* v. 103, no. 5, Feb. 2, 1956, p. 83-92.

Investigation on steel and nonferrous metals, factors contributing to cavitation, scale effect, effect of hydrodynamic properties. Graphs, tables. (To be continued.)
(R2, ST, EG-a)

155-R. (Russian.) **Cavitation Decay on Powerful Hydroturbine Blades.** I. R. Krianin. *Energomashinostroenie,* no. 3, Dec. 1955, p. 14-18.

Influence of material and certain construction factors on intensity of cavitating decay of blades. The main cause of decay is the presence of bolt holes. Diagrams, photographs. 5 ref. (R2)

156-R. (Russian.) **Determination of Cavitation by Means of Brittle Coatings.** E. V. Trifonov and V. I. Dumov. *Energomashinostroenie,* no. 1, Oct. 1955, p. 25-26.

Composition and application technology for varnish coatings. Use in study of cavitation in centrifugal pumps. Causes of cavitation. Photographs, graphs. 4 ref. (R2, S13)

157-R. (Russian.) **Effect of External Current and Cathode Polarization by Protectors on Increase of Fatigue Strength During Corrosion.** L. A. Glikman and L. A. Suprun. *Metallovedenie i obrabotka metallov,* no. 6, Dec. 1955, p. 10-15.

Fatigue curves for carbon-steel test specimens in air and salt solution with and without anodes of zinc-magnesium alloy. Effect of density of cathode current on corrosion-fatigue strength. Table, graphs, diagrams. 9 ref. (R1, R10, CN)

158-R. (Slovak.) **First Conference on Corrosion and Protection of Buildings.** Bohumil Zitnansky. *Zvaranie,* v. 4, nos. 9-10, Sept. 1955, p. 296-299.

Oscillography in studying corrosion, mechanism of corrosion, surface treatment, coatings and other anticorrosion measures.
(R general, L general, ST)

159-R. Corrosion Research Laboratories—8: Massachusetts Institute of Technology. Herbert H. Uhlig. *Corrosion Technology,* v. 3, Feb. 1956, p. 36-41, 58.

Description and background of laboratory and examples of recent and current research. Photographs. 55 ref. (R11, A9)

160-R. The Water Engineer and Cathodic Protection. K. A. Spencer. *Institution of Water Engineers, Journal,* v. 10, Feb. 1956, p. 51-76 + 3 plates; disc., p. 76-103.

Deals with bituminous-type coatings and cathodic protection for the exterior of buried metal pipelines, with special reference to their technical and economic advantages. Tables, photographs, graphs, diagrams. 10 ref. (R10, L26)

161-R. Atmospheric Corrosion by Nuclei. R. St. J. Preston and B. Sanyal. *Journal of Applied Chemistry,* v. 6, Jan. 1956, p. 26-44.

Experimental study of the mechanism of filiform corrosion, a type of metal corrosion in which narrow filaments grow from nuclei. Graphs, micrographs, tables. 13 ref. (R1, R3)

162-R. Search For Oxidation-Resistant Alloys of Molybdenum. G. W. P. Rengstorff. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Feb. 1956, p. 171-176.

In an effort to find an oxidation-resistant alloy of molybdenum, binary and ternary alloys containing aluminum, chromium, cobalt, iron, nickel, silicon, titanium, tungsten, vanadium and zirconium were screened. Fourteen other alloying additions also tested. Many of the alloys were more oxidation-resistant than molybdenum, but none were entirely satisfactory. Tables, graphs. 10 ref. (R2, Mo)

163-R. The Life of Pressure Vessels. Sydney D. Scorer, *Machinery Lloyd (Overseas Ed.)* v. 28, Jan. 21, 1956, p. 76-78.

An indirect method of measuring corrosion in pressure vessels and predicting remaining useful life. Diagrams, graph. (R5, R6, R7)

164-R. Watch Minor Constituents for Corrosion. E. V. Kunkel. *Oil and Gas Journal,* v. 54, Feb. 27, 1956, p. 126-127.

Deals primarily with mixtures of acetic acid, formic acid and formaldehyde, and mixtures of these with mineral acids such as sulfuric, sulfurous, phosphoric and toluene sulfonic and air and oxidizing agents such as sodium dichromate. Photograph, tables. 5 ref. (R5, R7, R1)

165-R. Cathodic Protection in Action. J. P. Barrett and E. D. Gould. *World Oil,* v. 142, Mar. 1956, p. 149-153.

Cathodic protection today includes method of determining the need for cathodic protection, current requirements for its application, results of protection of casing and cost of the process. Photograph, diagrams, graphs. 4 ref. (R10)

166-R. Application of Organic Inhibitors in Water-Flooding. J. B. Robinson. *World Oil,* v. 142, Feb. 1956, p. 156, 159-160, 162.

A method for successful treating with water soluble, semipolar, organic corrosion inhibitors. Examples of their use in three water-flood systems. Tables, diagrams. 1 ref. (R10)

167-R. How to Get the Most From Your Inhibitor. W. C. Koger. *World Oil,* v. 142, Mar. 1956, p. 167 + 4 pages.

Tests indicate an oil insoluble inhibitor, heavier than oil, can be used to inhibit high working fluid wells without a large volume of flush. Photograph, graphs. (R10)

168-R. The Behavior of Materials in Aggressive Liquid Metals. David H. Gurinsky. Paper from "Nuclear Metallurgy". IMD Special Report Series No. 2. American Institute of Mining and Metallurgical Engineers, Inc. p. 5-20.

Available information on the corrosive attack of mercury and molten lead and bismuth on common construction materials. Graphs, diagrams, tables. 18 ref. (R6, Hg, Pb, Bi)

169-R. Behavior of Materials in Nonaggressive Liquid Metals. Edwin G. Brush and Robert F. Koenig. Paper from "Nuclear Metallurgy". IMD Special Report Series No. 2. American Institute of Mining and Metallurgical Engineers, Inc. p. 21-32.

Nonaggressive liquid metals which are of greatest interest for nuclear power plants—sodium and sodium-potassium alloys. Graphs, tables, micrographs. 13 ref. (R6, Na, K)

170-R. Corrosion of Materials in Fused Hydroxides. G. P. Smith. Paper from "Nuclear Metallurgy". IMD Special Report Series No. 2. American Institute of Mining and Metallurgical Engineers, Inc. p. 71-94.

Some of the fused alkali metal hydroxides are of potential interest in reactor technology, both as coolants and as moderators. This review is concerned with the kinds of corrosion phenomena which have been observed in ceramics and in metals. Micrographs, photographs. 50 ref. (R6, Ni, Na, K)

171-R. (Hungarian.) **Laboratory Investigation of the Corrosive Effect of Various Types of Soils. I. Denison-Cell Investigations.** Mihaly Solti and Jozsef Horvath. *Magyar kémiai folyoirat,* v. 61, no. 12, Dec. 1955, p. 427-437.

Corrosivity of nine different types of soils investigated with steel electrodes in a modified Denison cell. Tables, graphs, micrographs, diagrams. 18 ref. (R8)

172-R. Corrosion Control Pays Off. T. L. Canfield. *American Gas Journal,* v. 183, Mar. 1956, p. 11-14.

In a distribution and transmission system assembled with a variety of facilities including all kinds of pipe and construction practices, the problems of providing adequate protection against corrosion are myriad. How a company is providing this protection is outlined. Drawing. (R10, L26)

173-R. Stress Corrosion of Austenitic Stainless Steels in High Temperature Waters. W. Lee Williams and John F. Eckel. *American Society of Naval Engineers, Journal,* v. 68, Feb. 1956, p. 93-104.

Deals with some aspects of stress corrosion of austenitic stainless steels when exposed to high temperature, water and steam. Graphs, diagram, photographs, micrographs, table. 28 ref. (R1, SS)

174-R. Navy Experimental Work With Cathodic Protection. Irving D. Gessow. *Corrosion,* v. 12, Mar. 1956, p. 18-23; disc., p. 23-24.

An account of work done by the Navy Bureau of Ships with cathodic protection of active and reserve ships. Photographs, tables. (R10)

175-R. Dealuminization of Aluminum Bronze. Mortimer Schussler and D. S. Napolitan. *Corrosion,* v. 12, Mar. 1956, p. 25-30.

Studies were carried out on samples of single and two-phase aluminum bronzes which were exposed to aqueous hydrofluoric acid, the

corrosive agent to which the valve failures were affixed. Diagrams, micrographs, photographs. 1 ref. (R5, Cu)

176-R. Positive-Polarity Grounding of Direct Current Supply Requirements in Mining Traction Systems. Sidney A. Gibson. *Corrosion,* v. 12, Mar. 1956, p. 37-40.

Corrosion of mine traction systems using positive-polarity grounding of direct current supply equipment described. Abnormally increased costs from excessive trolley insulator failures and a safety hazard resulting from possible formation of pure metallic sodium or potassium in corrosion products. Photographs. 2 ref. (R8)

177-R. Oxide Films on Stainless Steels. Thor N. Rhodin. *Corrosion,* v. 12, Mar. 1956, p. 41-52; disc., p. 53.

Compositional properties of oxide films isolated from surfaces of stainless steels were studied using specially developed micro-analytical techniques. Properties of passive films on stainless steel were evaluated. Effects of alloy composition and surface treatment on other types of films on Types 304, 316 and 347 stainless steels were studied. Diagrams, graphs, micrographs, photograph, tables. 31 ref. (R10, L19, SS)

178-R. Methods of Preventing Corrosion in Sewerage Systems. Ervin Spindel. *Corrosion,* v. 12, Mar. 1956, p. 54-58.

Relative merits and application techniques of chemical additives. Recommendations concerning control through design to increase velocity or eliminate vapor space are weighed. Diagram, photographs. 9 ref. (R10)

179-R. A Bibliography of Corrosion by Chlorine. *Corrosion,* v. 12, Mar. 1956, p. 59-66.

This report contains 86 abstracts of papers on corrosion by chlorine. It is indexed by materials and coded by the NACE Abstract Code. 21 ref. (R9)

180-R. Field Practices for Controlling Water-Dependent Sweet Oil Well Corrosion. *Corrosion,* v. 12, Mar. 1956, p. 67-71.

Use of the following devices on flowing wells: injection valves, side-door chokes, tapered tubing and special equipment. Consideration is given also to minimizing corrosion in gas lift wells and in pumping wells. Accounts of the use of plastic coated and special alloy tubing given. (R7)

181-R. Corrosion Problems at Stanlow Refinery. D. H. Nicholson. *Corrosion Prevention and Control,* v. 3, Feb. 1956, p. 37-39.

Types of corrosion in distillation and other equipment, hydrogen sulfide problems, graphitic softening of cast iron. Photograph. (R7, ST, CI)

182-R. The Surface Preparation of Ferrous Metals. J. Idger. *Industrial Finishing (London),* v. 9, Feb. 1956, p. 386. (Translated from *La Metallurgie,* v. 87, no. 2.)

Choice of preparation method dependent upon object in view and type of work to be treated. Discusses scale and oxide films. (To be continued.) (R2, L12)

183-R. The Prevention of the Corrosion of Ferrous Metals. J. C. Hudson. *Institution of Electrical Engineers, Journal,* v. 2, Feb. 1956, p. 84-88.

Mechanism of corrosion rust prevention by alternations in corrosive medium, design or composition of metal, application of protective coatings, cathodic protection. Graph, micrographs, photographs. 8 ref. (R general, L general, Fe, ST)

184-R. Enhanced Oxidation of Platinum in Activated Oxygen. George C. Fryburg. *Journal of Chemical Physics,* v. 24, Feb. 1956, p. 175-180.

An enhanced oxidation of platinum was observed in moist activated oxygen. Cause of this enhancement investigated. Diagrams, graphs, tables. 17 ref. (R2, Pt)

185-R. Predicting Corrosion Resistance by Microscopic Examination. John H. Scott. *Metal Progress,* v. 69, Mar. 1956, p. 79-80.

Stainless steel plates which must pass a 240-hr. nitric acid corrosion test can be released while the test is in progress by use of a quick microscopic screening method. Micrographs. (R11, SS)

186-R. Pitfalls to Avoid in the Design of a Cathodic Protection System. Wayne A. Johnson. *Pipe Line Industry,* v. 4, Mar. 1956, p. 24-26.

Consideration of these pitfalls will save money initially, cut operating expense, insure maximum efficiency. Graphs, diagrams. (R10)

187-R. The Gas-Oxide Interface and the Oxidation of Metals. T. B. Grimley and B. M. W. Trapnell. *Royal Society, Proceedings,* v. 234, ser. A, Feb. 21, 1956, p. 405-418.

Emphasizes importance of structure of the surface layer of oxygen adsorbed at the oxide-oxygen interface in determining the laws of

growth of thin oxide films on metals. Graph. 17 ref. (R2, L19, Cu, Al)

188-R. Aluminium in Contact With Other Materials. *Aluminium Development Association, Information Bulletin No.* 21, Dec. 1955, 48 p.

Causes and types of corrosive attack, principles of preventing attack, behavior of aluminium in contact with specific materials. An appendix summarizes the nature of metallic corrosion. Tables, photographs, diagrams. 7 ref. (R general, Al)

189-R. Effects of Water Quality on Various Metals. Lee Streicher. *American Water Works Association, Journal,* v. 48, Mar. 1956, p. 219-238.

Effects of Colorado River water on corrosion of several subscribing municipal systems. Tables, graphs, photographs. 3 ref. (R4)

190-R. Effects of Softened Water on Equipment. Loring E. Tabor. *American Water Works Association, Journal,* v. 48, Mar. 1956, p. 239-246.

Serious dezincification of value stress is caused by softening. Low-zinc bronzes are now specified. Tables, graph, diagrams. 1 ref. (R2, R4, Cu)

191-R. The Corrosion of Thorium. J. E. Draley. *Argonne National Laboratory (U. S. Atomic Energy Commission),* ANL-4908, Oct. 1952, 23 p.

A project literature search disclosed considerable inconsistency in the aqueous corrosion of thorium, depending on metal source and sample preparation. Graphs, tables. 11 ref. (R5, Th)

192-R. The Corrosion of Low-Zirconium Uranium Alloys in Boiling Water. J. E. Draley, J. W. McWhirter, F. Field and J. Guon. *Argonne National Laboratory (U. S. Atomic Energy Commission),* ANL-5030, Apr. 1953, 56 p.

Alloys containing 5 or 6 wt. % zirconium form good protective oxide films under certain conditions. Diagrams, graphs, micrographs, photographs, tables. 6 ref. (R4, U)

193-R. Corrosion Testing at High Temperatures. N. D. Greene, Jr. *Chemical Engineering,* v. 63, Apr. 1956, p. 175-180.

Problems involved in selection of materials for use at high temperatures, testing methods, application of test results. Table, diagrams, photographs. 5 ref. (R11)

194-R. The Prevention of Fretting Corrosion. R. B. Waterhouse. *Corrosion Prevention and Control,* v. 3, Mar. 1956, p. 37-39.

This corrosion develops when two surfaces in contact and nominally at rest with respect to each other, experience slight periodic relative movement. 16 ref. (R1)

195-R. The Dissolution of Zirconium and Corrosion of Stainless Steel in Sulfuric Acid and Nitric-Hydrofluoric Acid Mixtures. R. H. Gercke and D. Lewis. *Livermore Research Laboratory (U. S. Atomic Energy Commission),* AECD-3702, Jan. 1954, 11 p.

Results of tests in various concentrations of the acids and at various temperatures. Tables. (R2, R5, Zr, SS)

196-R. Summarizing Report on Stress Corrosion of Beryllium. Hugh L. Logan and Harold Hessing. *National Bureau of Standards (U. S. Atomic Energy Commission),* NBS-6, Dec. 1955, 11 p.

Stress-corrosion tests were made on beryllium in a circulating 0.002 to 0.006 molar hydrogen peroxide solution at a temperature of 85 to 93° C. There was no evidence of stress-corrosion cracking in any of the specimens tested. Diagrams, photographs, micrograph, tables. (R1, Be)

197-R. Galvanic Corrosion Properties of Titanium in Organic Acids. David Schlain, Charles B. Kenahan and Doris V. Steele. *U S. Bureau of Mines, Report of Investigations* 5189, Jan. 1956, 17 p.

Acids used were 10% formic, acetic, lactic and citric, 1% oxalic and tartaric and 9% oxalic. Electrode-potential measurements and several types of galvanic couple experiments were carried out. Solutions were aerated by flow of air, flow of helium and natural aeration, at 35° C. with couples consisting of equal areas of two metals. Tables, graphs, diagram. 8 ref. (R7, R1, Ti, Cu, SS, Al)

198-R. (German.) **The Influence of Impurities on the Corrosion Resistance of Aluminum.** P. Brenner, F. E. Faller and E. Höffler. *Aluminium,* v. 32, no. 1, Jan. 1956, p. 6-12.

Strips 1 mm. in thickness, annealed, semihard and homogenized, were tested for strength before, during and after exposure to corrosive agents. Tests lasted from six months to two years according to type of test. Macroscopic and microscopic examinations were made. Micrographs, graphs, tables. 7 ref. (R11, Al)

199-R. (German.) **Causes of Corrosion. II.** H. Grubitsch. *Chemie-Ingenieur-Technik,* v. 28, no. 1, Jan. 1956, p. 9-24.

The corrosion processes of the system metal-solution, with special reference to the fundamentals and phenomena of the primary reactions of acid corrosion. A further concluding report will deal with the corrosion by neutral electrolyte solutions. Graphs, diagrams, table. 396 ref. (R5)

200-R. (German.) **Special Corrosion Phenomena in Precision Fuses.** A. Deman. *NTZ; Nachricht in technische Zeitschrift,* v. 9, no. 1, Jan. 1956, p. 19-20.

Serious corrosion damage was observed on precision fuses, the cause of which was found to be due to a rise in the melting temperature originating from the formation of local Ag-Cd elements. Micrographs. 2 ref. (R1, R2, Ag, Cd)

201-R. (German.) **Transformation and Equilibrium States in Alkali-Hydroxide Melts. I. Effect of Alkali-Hydroxide-Melts on Gold, Silver and Platinum.** Hermann Lux and Titus Niedermaier. *Zeitschrift für anorganische und allgemeine Chemie,* v. 282, nos. 1-6, Dec. 1955, p. 196-209.

Investigation of effect of melts at 410° C., with a definite oxygen and hydrogen content in the gas-phase. Tables, diagrams. 12 ref. (R6, Ag, Au, Pt)

202-R. (German.) **Stress-Corrosion.** Kurt Matthaes. *Zeitschrift für Metallkunde,* v. 47, no. 1, Jan. 1956, p. 37-42.

Stress corrosion cracks in steel, magnesium and aluminium alloys, and brass. Chemical attack, the influence of time of exposure, concentration of attacking agent and of temperature. Table, graphs, diagrams. 13 ref. (R1, ST, Mg, Cu, Al)

203-R. (German.) **Corrosion and Electrochemistry.** G. Valensi. *Zeitschrift für Metallkunde,* v. 47, no. 1, Jan. 1956, p. 50-52.

Contribution to the definition of terms concerning chemical and electrochemical corrosion. 18 ref. (R general)

204-R. (Russian.) **Conditions of Intensity of Cavitation Erosion.** K. K. Shal'nev. *Izvestiia Akademii Nauk SSSR, Otdelenie Teknicheskikh Nauk,* 1956, no. 1, Jan. 1956, p. 3-20 + 6 plates.

Peculiarities of cavitation erosion of hydraulic equipment, particularly turbines. Effect of hydrodynamic factors. Micrographs, photographs, graphs, diagrams, tables. 83 ref. (R2)

205-R. Corrosion Problems in Pumping Acid Mine Water. G. Reinberg. *American Institute of Mining Metallurgical and Petroleum Engineers, Preprint,* 1956, Feb. 1956, 8 p.

Origin and control of principal types of erosive and corrosive pump damage. Corrosion problems in Peruvian mine pumping equipment. 1 ref. (R4)

206-R. Phenomena Resembling Stress Corrosion Cracking in Steel Under Load Induced by Diffusion of Hydrogen. I. Class. *Henry Brutcher Translation No.* 3538, 21 p. (Abridged from *Werkstoffe und Korrosion,* v. 6, no. 5, 1955, p. 237-245.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 326-R, 1955. (R1, AY, ST)

207-R. On The Intergranular Corrosion of Austenitic Chromium-Nickel Steel. E. Brauns and G. Pier. *Henry Brutcher Translation No.* 3662, 16 p. (Condensed from *Stahl und Eisen,* v. 75, no. 9, 1955, p. 579-586.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 246-R, 1955. (R2, SS)

208-R. (French.) **The Rate of Dissolution of Nickel in Nitric Acid.** T. G. Owe Berg. *Journal de Chimie Physique,* v. 54, no. 2, Feb. 1956, p. 154-162.

Rate was measured from 0 to 65° C. for concentrations between 0.025 *N* and 14.5 *N*. Below 3.5 *N*, the rate of dissolution is proportional to the square root of the concentration. Above 9 *N*, the results are very complex and difficult to reproduce. Tables, graphs. 3 ref. (R2, Ni)

209-R. (French.) **The Rates of Dissolution of Iron and Iron-Chromium Alloys in Nitric Acid.** T. G. Owe Berg. *Journal de Chimie Physique,* v. 54, no. 2, Feb. 1956, p. 163-168.

The rates of dissolution in nitric acid of soft steel and iron-chromium alloys were measured between 0.25 *N* and 10 *N*. The soft steel and alloys with ½, 1 and 2% chromium dissolve like Armco iron, the adsorption of the reagents governing the rate. For the other alloys, the rate of dissolution is proportional to the square root of the acid concentration. Tables, graphs. 2 ref. (R2, CN, AY)

210-R. (German.) **The Effect of Impurities on Corrosion Resistance of Aluminum.** P. Brenner, F. E. Faller and E. Höffler. *Aluminium,* v. 32, no. 2, Feb. 1956, p. 64-70.

Results of macroscopic and microscopic tests on specimens in the original state and after weathering, repeated immersion and rotated

corrosion tests. Corrosion effect on mechanical properties. Copper reduces corrosion most, then iron, next silicon. Micrographs. 7 ref. (R11, Q general, Al)

211-R. (German.) **The Corrosion of Aluminum Structural Parts of a German Escort Vessel Sunk During the War.** F. E. Faller. *Aluminium,* v. 32, no. 3, Mar. 1956, p. 136-138.

Study of the effect of 7-yr. total immersion in sea water on wheelhouse superstructure, wheelhouse roof and top bulwark, constructed of AlCuMg F-38 clad sheet and 99.5% Al sheets; section, bars and rivets of AlMg7; and window frames of AlSi casting alloy. Only slight corrosion is shown. Photograph, micrographs. (R4, T22, Al)

212-R. (German.) **Electrical Corrosion Protection of Buried Cables and Pipes.** Heinrich Riedel. *Elektrotechnische Zeitschrift,* v. 77, Ausgabe A, no. 5, Mar. 1956, p. 129-136.

Apparatus and devices used in cathodic protection processes. Graphs, diagrams. 22 ref. (R10)

213-R. (German.) **A Survey of the Methods and Specifications of Accelerated Tests in the Climatic Testing Procedure.** Artur Kutzelnigg. *Werkstoffe und Korrosion,* v. 7, no. 2, Feb. 1956, p. 65-82.

A tabulated review of the climatic testing methods, published in German and foreign literature. Tables. 180 ref. (R11)

214-R. (Russian.) **Effect of the Temperature Factor on the Rate of Corrosion of Metals in Electrolytes.** V. V. Gerasimov, G. V. Akimov and I. L. Rozenfel'd. *Izvestiia Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk,* 1956, no. 1, Jan. 1956, p. 12-15.

Studies of iron-zinc, copper-iron, copper-zinc and copper-magnesium couples in salt solutions or hydrogen peroxide. Graphs, tables. 4 ref. (R1, R5, Fe, Zn, Cu, Mg)

215-R. (Russian.) **Mechanism of Inhibitor Action.** L. I. Kashtanov and N. V. Kazanskaia. *Zhurnal Obshchei Khimii,* v. 26, no. 1, Jan. 1956, p. 184-186.

Retardation of corrosion in oxidation reactions. Inhibitors studied include hydroquinone, aniline, phenol, naphthylamines and others. Tables. 27 ref. (R10)

216-R. (Russian.) **Some Regularities in the Phenomena of the Electrical Erosion of Metals During Low-Voltage Discharge in a Liquid.** I. G. Nekrashevich and S. P. Mitkevich. *Zhurnal Tekhnicheskoi Fiziki,* v. 26, no. 1, Jan. 1956, p. 90-95.

Breakdown or erosion of electrodes during low-voltage condenser discharge in transformer oil. An approximate quantitative expression is developed for erosion during discharge between electrodes of the same metal, and of different metals. Tables, graph. 3 ref. (R1, Pb, Zn, Cu, Co, Ni, Fe, Al, Cr, W)

217-R. Corrosion Experiments With 2S Aluminum at 200° C. W. E. Ruther. *Argonne National Laboratory (U. S. Atomic Energy Commission),* ANL-5500, Mar. 1956, 12 p.

Lowest corrosion rates were obtained in dilute sulfuric acid at pH near 3; dichromate ion and dissolved oxygen increased the corrosion rate (neutral pH); chloride ion (5 p.p.m.) caused some pitting and increased the corrosion rate slightly; coupling to more cathodic materials such as graphite and zirconium caused no noticeable effect on the aluminum corrosion in distilled water. Tables, photograph, graphs. 2 ref. (R11, R5, R4, Al)

218-R. Integration of Corrosion Control in Pier Substructures. Carl R. Johnson. *Corrosion,* v. 12, Apr. 1956, p. 157-160.

Integration of cathodic protection in design of three piers, constructed of steel H-piling driven to rock. Details of installation, criteria of protection and other details of tests, surveys and installation. Diagrams, table. (R10, R11, SS)

219-R. A Simple Graphical Method for Checking the Adequacy of Stress Corrosion Specimen Dimensions Against Stress Concentrations. Robert H. Hay. *Corrosion,* v. 12, Apr. 1956, p. 171-173.

Simple theory, taking into account stress concentrations due to holes and fillets, is developed and reduced to a convenient, easy-to-use graphical form which is explained by examples of its use. Diagram, graph. 3 ref. (R1, R11)

220-R. The Effect of Cold Work and Heat Treatment on the Rate of Dissolution of Pure and of Impure Aluminum in Acids and Bases. M. E. Straumanis and Y. N. Wang. *Corrosion,* v. 12, Apr. 1956, p. 177-182.

Includes diagram, photograph, tables. 34 ref. (R2, Al)

221-R. The Kinetics of the Corrosion of Copper in Acid Solutions. John Randel Weeks and George Richard Hill. *Electrochemical Society, Journal,* v. 103, Apr. 1956, p. 203-208.

Kinetic data obtained show the effect of pH, dissolved oxygen chlo-

ride ion and temperature on the corrosion rate. Tables, graphs. 26 ref. (R5, Cu)

222-R. Oxidation of Aluminum in the Temperature Range 400°-600° C. W. W. Smeltzer. *Electrochemical Society, Journal,* v. 103, Apr. 1956, p. 209-214.

A vacuum microbalance technique showed that the oxidation rate decreased to a low value after a formative stage of film growth which was governed by a parabolic law. Tables, graphs. 27 ref. (R2, Al)

223-R. Erosion of Steel by Hot Gases. M. J. Fraser and A. A. Burr. *Electrochemical Society, Journal,* v. 103, Apr. 1956, p. 224-231.

A vent-plug device for producing eroded surfaces is used in the study of conditions existing in weapons during firing. Tables, graphs, photographs, micrographs. 18 ref. (R1, ST)

224-R. The Chemistry and Metallurgy of Corrosion of Metals by Fertiliser Materials. W. D. Clark. *Fertiliser Society, Proceedings, No.* 32, 1955, p. 4-22; disc., p. 22-23.

Theory of corrosion processes, resistance of metals to corrosion, corrosive propetries of fertilizers. Tables, diagrams, photographs. (R6, R7)

225-R. The Corrosion of Steels in Relation to Fertiliser Chemicals. C. R. Pipe. *Fertiliser Society, Proceedings, No.* 32, 1955, p. 31-47; disc., p. 48-49.

The corrosion of steels with special reference to fertilizer chemicals. In considering the types of steel available, reference is made to the economic factors related to their production. Photograph, diagram, micrographs, tables, graph. 15 ref. (R6, R7, ST)

226-R. Research Tackles Turbine Corrosion. F. H. Pennell. *Marine Engineering,* v. 61, Apr. 1956, p. 108-109.

Techniques for the control of erosion-corrosion. Diagram, photographs. (R1, R10, AY)

227-R. Galvanic Corrosion of Aluminum. Fred Pearlstein. *Metal Finishing,* v. 54, Apr. 1956, p. 52-57.

Corrosion of titanium, nickel, tin and cadmium in contact with aluminum. The desirability of electrodepositing cadmium or tin on copper or steel was investigated. Photographs, tables. (R1, L17, Al, Cd, Sn, Cu, ST)

228-R. Stress-Corrosion Cracking of Stainless Steel. G. Klingel. *Metal Progress,* v. 69, Apr. 1956, p. 77-78.

Surface stress is often present in hardened stainless steel parts even after stress-relieving treatments. Removal of a thin surface layer after heat treatment can prevent stress-corrosion failures. Micrograph, photographs. (R1, SS)

229-R. Corrosion by Molten Metal. (Digest of a paper entitled "The Behavior of Materials in Aggressive Liquid Metals", by David H. Gurinsky of Brookhaven National Laboratory, read before the American Institute of Mining, Metallurgical and Petroleum Engineers, Feb. 20, 1956.) *Metal Progress,* v. 69, Apr. 1956, p. 160, 162, 164.

Mass transfer of iron in bismuth alloys studied using a simple rectangular loop of pipe. One vertical leg of this was kept hot by electrical windings; the other leg was bare and cooled by fans. (R6, Bi, Fe)

230-R. Corrosion of Lead-Base Babbitt Alloys. (Digest of papers presented at a symposium on "Lead-Base Babbitt Bearings", sponsored by the American Society of Mechanical Engineers, 1952.) *Metal Progress,* v. 69, Apr. 1956, p. 174, 176.

Systematic tests made on machined samples of various babbitts in oil with and without oleic acid. Test temperature was held at 175° F., and oxygen was bubbled through the oil at a rate of 0.023 cu.ft. per hr. A tin-base babbitt was unaffected in all oil mixtures, and various lead-base babbitts were also practically unaffected in the plain oil. (R7, Sn, Pb)

231-R. The Corrosion of Beryllium in Simulated Cooling Water for the Materials Testing Reactor. James L. English. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission)* ORNL-772, Jan. 1951, 55 p.

Compares the corrosion resistance of extruded versus sintered beryllium tested over a period of one year, as well as the general effect of long-time exposure on extruded beryllium exposed to simulated reactor cooling water. Graphs, photographs, tables. 1 ref. (R4, Be)

232-R. Corrosion Study for a Chemical Processing Plant. I-II. Frank A. Knox. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission),* Y-589, Aug. 1950, 30 p.

Investigates the corrosion resistant properties of various construction materials for a chemical processing plant for the production of hafnium-free zirconium using several corrosive solutions. Tables. (R6)

233-R. Cathodic Protection Teams Up With Water Treatment to Stop

Corrosion. M. J. Olive. *Oil and Gas Journal,* v. 54, Apr. 16, 1956, p. 220, 223, 224, 227.

Combined system used in an East Texas gasoline plant. Diagram, tables, photographs. (R10, ST)

234-R. Corrosion Resistance of Stainless Thread Inserts in Aluminum and Magnesium Alloys. Paul E. Wolfe. *Product Engineering,* v. 27, Apr. 1956, p. 176-179.

Extensive salt-spray tests show that no finish is needed on the insert; various finishes for flange and washer are evaluated for blind and through holes with and without bolts inserted; design suggestions for finish specifications. Photographs. 7 ref. (R11, SS, Al, Mg)

235-R. Build Corrosion Resistance Into Stainless. J. J. Heger. *Steel,* v. 138, Apr. 9, 1956, p. 116-117.

Stresses use of good fabrication design. Graph, diagrams. (R general, SS)

236-R. Corrosion, a Versatile Vandal. Bernard L. Kline. *Western Union Technical Review,* v. 10, Apr. 1956, p. 52-56.

Special cases and circumstances; chemical examination. (R general)

237-R. Some Aspects of Intergranular Corrosion of an Austenitic Stainless Steel. A. V. Shreider. *Henry Brutcher Translation No.* 3632, 14 p. (From *Zhurnal Prikladnoi Krimii,* v. 28, no. 6, 1955, p. 608-615.) Henry Brutcher, Altadena, Calif.

A study of 607 heats of this steel shows that different zones of the same sheet are susceptible. Resistance to this form of corrosion can be derived from chemical analysis and metallography. Diagrams, graph, photographs. 11 ref. (R2, SS)

238-R. (Czech.) **The Morphology of Precipitates in Titanium-Stabilized Stainless Steel.** Vladimir Cihal and Jaroslav Jezek. *Hutnické Listy,* v. 11, no. 3, Mar. 1956, p. 151-154.

Studies in connection with intergranular corrosion, after heating at high temperatures, by X-ray and electron-microscope techniques. Tables, micrographs, X-ray diffractogram. 6 ref. (R2, N7, SS)

239-R. (German.) **Corrosion of Bronze in Sandy Soil. A Contribution to Research in Corrosion.** W. Geilmann. *Angewandte Chemie,* v. 68, no. 6, Mar. 21, 1956, p. 201-211.

Disintegration of bronze in humus sandy soil is followed by analysis of a number of prehistoric bronzes. Rate is based on oxygen and carbon dioxide contents of ground waters. Tables. micrographs, photographs. 12 ref. (R8, Cu)

240-R. (German.) **Attack of Iron-Saturated Zinc Melts on Aluminum-Containing Iron.** Dietrich Horstmann. *Archiv für das Eisenhüttenwesen,* v. 27, no. 3, Mar. 1956, p. 161-163.

Relationship between time and temperature on iron with an aluminum content of up to 4.9%. Growth of iron-zinc layers. (R6, L16, Al, Fe, Zn)

241-R. (German.) **Effect of Rolled and Annealed Surface Layer on Corrosion of Steel and the Service Life of Protective Coatings.** Franz Eisenstecken. *Archiv für das Eisenhüttenwesen,* v. 27, no. 3, Mar. 1956, p. 179-185.

Role of the above surface layer in aqueous solutions and in steam boilers. Table, graphs, diagrams, photographs. 11 ref. (R4, R5, ST)

242-R. The Corrosion of Thorium in Air. M. W. Mallett and W. M. Albrecht. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* BMI-819, Apr. 1953, 17 p.

Corrosion of thorium in air in the range 100 to 900° C. follows a linear reaction rate and is principally an oxidation process. Two energies of activation were found, 13 k-cal. per mole for the 100 to 200° C. range, and 18 k-cal. per mole for the 400 to 900° C. range. These activation energies are probably caused by different rate-determining steps in the corrosion process. Graphs, photograph. 11 ref. (R2, R3, Th)

243-R. Acid-Leaching Demands Careful Design. *Chemical Engineering,* v. 63, May 1956, p. 126, 128, 130.

Protection against corrosive conditions has paid off in pioneer uranium-from-gold-slimes plant. Photographs. (R10, B14, U)

244-R. Corrosion Problems in the Marine Industry. George Fearnley. *Chemistry in Canada,* v. 8, Apr. 1956, p. 71, 72, 74.

Protective coating tests, nonferrous alloys, anticorrosive pigments, surface preparation, cleaning tests, corrosion of stern plates. 3 ref. (R3, R4, L26, ST)

245-R. Corrosion Prevention in Packaging. *Corrosion Prevention and Control,* v. 3, Apr. 1956, p. 3S + 4 pages.

Various protectives and associated products for special application, including dewatering oils and vapor phase inhibitors. Photographs. (R10)

246-R. Volatile Corrosion Inhibitors. A. B. Cox and E. C. Kuster. *Corrosion Prevention and Control,* v. 3, Apr. 1956, p. 9S-12S, 14S.

Development and uses of volatile corrosion inhibitors. Laboratory tests show how some of the factors discussed affect their use in packaging. Tables. 31 ref. (R10)

247-R. Corrosion Resistance of Some Austenitic Cr-Ni Steels of 18-8 Ti Composition. The Effect of Variation in Chemical Composition and Thermal Treatments. E. J. Heeley and A. T. Little. *Iron and Steel Institute, Journal,* v. 182, Mar. 1956, p. 241-255.

For welded chemical plant items to be exposed to onerous corrosive conditions of the 'nitric acid' type, 18-8 Ti steels having a maximum carbon content of 0.06%, with a suitable titanium-carbon ratio, are much superior to those containing 0.10% and above of carbon. Graphs, micrograph, photographs, tables. 3 ref. (R general, SS)

248-R. Studies in Corrosion. G. H. Cartledge. *Scientific American,* v. 194, May 1956, p. 35-40.

Technetium, the synthetic element found in the products of uranium fission, strongly inhibits the oxidation of iron. This phenomenon suggests a new explanation for the action of corrosion inhibitors. Photographs, diagrams, micrograph, radiograph. (R10, R2, Tc)

249-R. (French.) Influence of Ultrasonics on the Anodic Dissolution of Metals. René Audubert and Jacques Guitton. *Comptes Rendus,* v. 242, no. 11, Mar. 12, 1956, p. 1458-1462.

Influence of cavitation produced by an ultrasonic beam, accompanied by different electrochemical reactions at the nodes and antinodes. Micrograph, graphs. 4 ref. (R2)

250-R. (German.) Hydrazine Application as Binder of Oxygen in High-Pressure Boiler Feed-Water. W. Nissen. *Energietechnik,* v. 6, no. 3, Mar. 1956, p. 108-112.

Chemical properties of hydrazine. German and foreign experience in use as a corrosion inhibitor. Effect of temperature. Corrosion preventive action. 8 ref. (R10, R4)

251-R. Corrosion of Cutlery in Contact With Packing Material. E. A. Oldfield. *British Paper and Board Makers' Association, Proceedings of the Technical Section,* v. 36, pt. 3, Dec. 1955, p. 509-522; disc., p. 523-534.

Cutlery stainless steel can be corroded by high chloride content paper and board. Additional protection can be supplied to metal goods by the use of desiccating containers, inhibitors or films of plastic and petroleum derivatives. Diagram, photographs. 11 ref. (R7, R10, SS)

252-R. Corrosion Studies of Carbon Steel in Alkaline Pulping Liquors by the Potential-Time and Polarization Curve Methods. I. Theory, Methods, and Selected Results. W. A. Mueller. *Canadian Journal of Technology,* v. 34, May, 1956, p. 162-181.

Studies indicate that carbon steel immersed in strong white liquor near room temperature displays two stable states which differ in potential and corrosion rate. Theoretical principles were derived for the measurement of reproducible polarization curves and their analysis to determine the electrochemical reactions involved. Table, graphs, diagrams, photograph. 20 ref. (R5, CN)

253-R. Beneficial Effect of Alloy Additions to Zirconium on the Corrosion Resistance in 600° F. Water. D. S. Kneppel and T. T. Magel. *Massachusetts Institute of Technology, Metallurgical Project (U. S. Atomic Energy Commission),* MIT-1092, Apr. 1952, 11 p.

Results obtained have indicated that additions of iron, nickel or chromium will allow higher levels of impurities in zirconium and still maintain good corrosion resistance in 600° F. water. Effects of these alloying elements are even greater in steam corrosion. Photographs, tables. 1 ref. (R4, Zr)

254-R. Effect of Metallurgical Variables on the Corrosion of Extruded Beryllium. Arnold R. Olsen. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission),* ORNL-1146, Apr. 1952, 58 p.

Tests were made on a single vacuum cast beryllium billet which was subjected to several different treatments. Tables, graphs, photographs. (R general, Be)

255-R. (German.) Chemical and Electrochemical Corrosion. Heribert Grubitsch. *Zeitschrift für Metallkunde,* v. 47, no. 3, Mar. 1956, p. 184-190.

Definitions of electrochemical and chemical corrosion phenomena. The primary stage of corrosion consists in an adsorption of ions or molecules; it was found that adsorption according to Van der Waals does not contradict the electrochemical corrosion theory. Graphs, micrograph, diagram. 104 ref. (R1)

256-R. (Italian.) On Hot Corrosion in Common Hypochlorite of 18-8 Ti, 18-8

and 18-Ti Welded Stainless Steels. C. Bighi and G. Pancaldi. *Metallurgia Italiana,* v. 48, no. 2, Feb. 1956, p. 73-81.

Accelerated corrosion tests using samples with flat or curved surfaces in different dipping conditions. Corrosion products, dissolved in the hypochlorite, were determined by colorimetric methods. Photographs, tables, micrographs. 26 ref. (R5, SS)

257-R. (Russian.) **Effect of Impurities on the Rate of Solution of Cadmium in Hydrochloric Acid.** Ia. V. Durdin and S. A. Nikolaeva. *Leningradskogo, Universiteta, Vestnik, Seriia Fiziki i Khimii,* v. 11, no. 4, Feb. 1956, p. 83-97.

Effect of lead, iron copper, etc., as impurities on the rate of corrosion of cadmium. Relation of rate of solution of cadmium to the degree of its purification by means of fractional distillation. Effect of washing surface of cadmium with nitric acid on rate of solution of thrice-distilled cadmium. Electrochemical mechanism of the solution of metals in acids. Tables, graphs, diagram. 15 ref. (R6, R2, Cd)

258-R. (Russian.) **Study of the Rate of Solution and the Potential of Zinc Being Dissolved in Solutions of Hydrochloric and Sulfuric Acids.** K. A. Dvorkin and Ia. V. Durdin. *Leningradskogo, Universiteta, Vestnik, Serriia Fiziki i Khimii,* v. 11, no. 4, Feb. 1956, p. 99-110.

Measuring methods. Electrochemical theory of the corrosion of metals, including the theory of local elements. Relation of rate of solution of rolled or cast specimens to temperature, concentration of acid, other factors. Tables, graphs, diagrams. 37 ref. (R1, R5, Zn)

259-R. (Russian.) **Use of the Oscillographic Method for the Study of the Kinetics of the Solution of Iron in Sulfuric Acid.** Ia. V. Durdin and V. I. Kravtsov. *Leningradskogo, Universiteta, Vestnik, Seriia, Fiziki i Khimii,* v. 11, no. 4, Feb. 1956, p. p. 127-131.

Oscillograms of the switching on and off of direct current were photographed. Equations relate the variation in potential and cathodic polarization. Graphs, table. 6 ref. (R5, R11, Fe)

260-R (Russian.) **Apparatus for Determining the Corrosive Aggressiveness of the Atmosphere.** N. D. Tomashov, G. K. Berukshtis and A. A. Lokotilov. *Zavodskaia Laboratoriia,* v. 22, no. 3, Mar. 1956, p. 345-349.

Principles and use of apparatus, consisting of a package of copper cathodic electrodes and iron anodic electrodes. Relation of current variation to relative humidity and time. Diagrams, graphs. 9 ref. (R3)

261-R. (Book-German.) **Chemical Behavior of Aluminum. Experience and Results from Research and Practice.** 333 p. 1955. Aluminum-Verlag GmbH, Dusseldorf, Germany.

Corrosion phenomena, tests, prevention and control. Behavior in contact with organic and inorganic compounds, other metals, and food, beverages, tobaccos and spices. (R general, P13, Al)

262-R. Collection and Correlation of High Temperature Hydrogen Sulfide Corrosion Data. *Corrosion,* v. 12, May 1956, p. 213-234.

Corrosion by gas mixtures containing hydrogen sulfide at elevated temperatures reviewed, with particular emphasis on the types of environments present in catalytic reforming and desulfurizing units of petroleum refineries. Graphs, photograph, tables. 86 ref. (R9)

263-R. Corrosion Mitigation in a Metropolitan Area. M. C. Miller. *Corrosion,* v. 12, May 1956, p. 247-253.

How utility companies participated jointly in the designing and installaton of a cathodic protection system to provide protection to all metallic structures in a certain downtown area; 11 50-amp. rectifiers were installed at selected locations throughout the area. Diagrams, photograph. (R10, R8)

264-R. An Application of Cathodic Protection to the Inside of a Tank. J. H. Graves. *Corrosion,* v. 12, May 1956, p. 254-256.

Results of cathodic protection against internal corrosion of a 10,000-bbl. tank. It is calculated that four 17 lb. anodes would last 3 to 4 yr. Graphs. (R10, R7)

265-R. Cell Corrosion on Lead Cable Sheaths. *Corrosion,* v. 12, May 1956, p. 257-259.

Action in a concentration cell described and shown in accompanying diagram. Attack by differential aeration cell action and a case involving galvanic corrosion of a lead telephone cable sheath. Diagrams, photographs. (R1, Pb)

266-R. Low-Temperature Corrosion by Flue-Gas Condensates. III. R. W. Kear. *Corrosion Technology,* v. 3, Apr. 1956, p. 125-127.

Methods of reducing corrosion by flue-gas condensates, including fuel selection and the addition of inerts, dusts and smokes. 30 ref. (R9, R5)

267-R. Dissolution of Cadmium in Chromic Chloride Solutions. Cecil V.

King and Edward Hillner. *Electrochemical Society, Journal,* v. 103, May 1956, p. 261-265.

Dissolution rate of cadmium was determined in dilute chromic chloride solutions containing hydrochloric acid up to 4M as functions of concentration, stirring speed and temperature. The potential of the metal in these solutions is essentially that of the cadmium-cadmium ion couple, and there is little if any anodic polarization. Graphs, tables. 15 ref. (R2, Cd)

268-R. High Pressure Oxidation of Metals—Tungsten in Oxygen. J. P. Baur, D. W. Bridges and W. M. Fassell, Jr. *Electrochemical Society, Journal,* v. 103, May 1956, p. 266-272.

An investigation of the oxidation behavior of tungsten over the temperature range from 600 to 850° C. and oxygen pressures from 20 to 500 psia. Graphs, photographs, tables. 26 ref. (R2, W)

269-R. Oxidation of Oxygen-Free High Conductivity Copper to Cu_2O. J. P. Baur, D. W. Bridges and W. M. Fassell, Jr. *Electrochemical Society, Journal,* v. 103, May 1956, p. 273-281.

Oxidation behavior of high-purity oxygen-free high-conductivity (OFHC) copper at temperatures of 900, 950 and 1000° C. at oxygen pressures which permit the formation of Cu_2 alone. Diagram, graphs, micrographs, tables. 47 ref. (R2, Cu)

270-R. Corrosion of Copper-Gold Alloys by Oxygen-Containing Solutions of Ammonia and Ammonium Salts. J. I. Fisher and J. Halpern. *Electrochemical Society, Journal,* v. 103, May 1956, p. 282-286.

Copper-gold alloys, ranging in gold content from zero to 15 at. %, were exposed to stirred aqueous solutions of ammonia and ammonium salts under oxygen partial pressures of up to 6.8 at. Effect on the kinetics of solution composition, oxygen pressure and temperature. Graphs. 9 ref. (R5, Cu, As)

271-R. Acceleration of the Dissolution of Iron in Sulfuric Acid by Ferric Ions. Harry C. Gatos. *Electrochemical Society, Journal,* v. 103, May 1956, p. 286-291.

The role of Fe+++ on the dissolution of iron in acids was investigated quantitatively; the changes in hydrogen evolution which result from the presence of Fe+++ were also studied. Graphs, tables. 8 ref. (R2, Fe)

272-R. The Influence of Mercury on Aluminum Corrosion. D. R. de Halas. *Hanford Atomic Products Operation (U. S. Atomic Energy Commission),* HW-28129, May 1953, 35 p.

Tests used a heated recirculating water system containing metallic mercury and various concentrations of mercury ion to determine the pitting tendency of mercury on aluminum slugs. Graph, table, photographs. 10 ref. (R4, R6, Hg, Al)

273-R. Inhibition and Inhibitors. Hellmuth Fischer. *Industrial Finishing (London),* v. 9, Apr. 1956, p. 486 + 5 pages.

How corrosion inhibitors function; technical applications. Diagrams. (R10)

274-R. An Investigation Into the Air-Heater Corrosion of Oil-Fired Boilers. B. Lees. *Institute of Fuel, Journal,* v. 29, Apr. 1956, p. 171-175.

Methods which have been successfully applied to reduce the fouling and wastage. Future experiments to ascertain optimum operating conditions and the most suitable air-heater design. Diagrams, graphs, table. 3 ref. (R9)

275-R. Statistical Analysis of the Corrosion of Uranium. II. Effects of Rolling and Alpha Annealing on Uranium Exposed to Moist Helium. J. T. Waber. *Los Alamos Scientific Laboratory (U. S. Atomic Energy Commission),* LA-1577, May 1952, 34 p.

No definite effect was observed on the detailed corrosion behavior of the specimens as a result of rolling or annealing. Graphs, tables. 2 ref. (R11, F23, J23, U)

276-R. (German.) **Systematic Investigations to Test the Anticorrosive Efficacy of VPI Upon a Number of Common Metals.** Wener Paul. *Werkstoffe und Korrosion,* v. 7, no. 4, Apr. 1956, p. 189-198 + color plate.

The effect of vapor phase inhibitor protection on the behavior of many common metals and alloys was investigated systematically. Provides exact data for industrial application. Photographs, micrographs, table. 4 ref. (R10, Ag, Zn, Cd, Al, Cu, ST)

277-R. (Japanese.) **On Scale Penetration in Steel at High Temperatures.** Mitsutoshi Washida, Daisaku Yamamoto and Kiyoshi Yoshida. *Iron & Steel Institute of Japan, Journal,* v. 41, no. 5, May 1955, p. 515-519.

When iron and steel are heated in an oxidizing atmosphere at high temperature, the oxidation scale penetrates into matrix right below the surface scale. A study is presented of the phenomena of this penetration under various conditions using a rimmed steel. Diagram, graphs, photographs. 10 ref. (R2, ST)

278-R. (Russian.) **Corrosion Diagrams of Iron and Steels in Oxidizers.** V. P. Batrakov. *Doklady Akademii Nauk SSSR*, v. 107, no. 2, Mar. 11, 1956, p. 269-272.

Concentration of oxidizers in solutions at four different levels. Interrelation of concentration factor, composition of steel, temperature, pH of solution, and anode current density on rate of corrosion. Graphs. 5 ref. (R5, AY, Fe)

279-R. (Russian.) **Corrosion-Abrasion Wear in Water Economizers and a Method of Protecting Them.** A. V. Riabchenkov and O. N. Muravkin. *Energomashinostroenie,* no. 3, Mar. 1956, p. 19-23.

Relation between wear of boiler pipes and the angle of attack and speed of flow of hot gases. Longitudinal rods welded on outside of pipe considerably lessen wear and increase service life. Diagrams, graphs, micrographs, photographs. (R1, ST)

280-R. (Russian.) **Protection of Underground Gas Mains From Outside Corrosion.** E. S. Makhover. *Gazovaia Promyshlennost',* no. 3, Mar. 1956, p. 20-25.

Electrical equipment, proper anode grounding, electrodrainage, and cathodic protection used in preventing electrochemical corrosion of gas pipeline in contact with soil. Testing equipment. Diagrams, photograph. (R10, R8, ST)

281-R. (Russian.) **On the Nature of the Passive Film on Iron in Acid Solutions.** A. M. Sukhotin. *Uspekhi Khimii,* v. 25, no. 3, 1956, p. 312-328.

A review of recent, primarily German, publications on the mechanism of origination, retention and destruction of passive films on iron. Properties of the passive film and problems of activation and passivation of iron in acid solutions. Graphs, table. 45 ref. (R10, Fe)

282-R. (Russian.) **Problem of Study of Corrosion Properties of Metals.** I. Oknin. *Zhurnal Prikladnoi Khimii,* v. 29, no. 3, Mar. 1956, p. 360-369.

The time:potential ratio of metal solution, and ratio of reaction between its electrons and the media, are the entire expression of corrosion behavior. Graphs. 9 ref. (R2)

283-R. (Russian.) **Kinetics of Corrosion Process.** A. I. Shultin. *Zhurnal Prikladnoi Khimii,* v. 29, no. 3, Mar. 1956, p. 369-379.

Oxidation is conditioned by the difference of the thermodynamic potentials in electrolytes. The process of electrochemical oxidation-reduction is combined by a series of steps: diffusion-migration phenomena, concentrated polarization, and chemical polarization. Electromotive force is used. Graphs. 6 ref. (R1)

284-R. The Corrosion of Zirconium in 600° F. Water and in 750° F. Superheated Steam. H. A. Pray and R. S. Peoples. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* BMI-T-55, Jan. 1951, 30 p.

The 750° F. steam test discloses corrosion characteristics in a much shorter time than the 600° F. water test. Raising the test temperature from 600 to 750° F. without changing the pressure accelerates attack. Graphs, photographs, tables. (R4, Zr)

285-R. The Thermal Oxidation and Reduction of a Copper (110) Face. A. Goswami and Y. N. Trehan. *Faraday Society, Transactions,* v. 52, Mar. 1956, p. 358-362 + 2 plates.

Work was undertaken to study in greater detail the mode of oxidation in air and subsequent reduction by molecular hydrogen of the oxides formed on a nearly (110) face of a single crystal of copper, thus eliminating the variables associated with reactions occurring on a polycrystalline surface. Table, diffractograms. 23 ref. (R2, Cu)

286-R. Studies in the Corrosion of Metals Occasioned by Aqueous Solutions of Some Surface-Active Agents. IV. Aluminium. H. Holness and R. D. Langstaff. *Journal of Applied Chemistry,* v. 6, Mar. 1956, p. 115-124.

Action of dilute aqueous solutions of representative anionic, cationic and nonionic wetting agents on aluminum studied, using tap and distilled water. Photographs, graphs. 12 ref. (R5, Al)

287-R. Study of the Characteristics of the Corrosion Film on Zirconium Using Polarized Light. Nels Roland Nelson and John Wade Heintz. *Massachusetts Institute of Technology (U. S. Atomic Energy Commission),* TID-5116, May 1952, 213 p.

Without additional investigation, polarized light cannot be used to test the corrosion resistance of a random zirconium sample. (R11, Zr)

288-R. Corrosivity of Packaging Materials. E. Wallenberg and B. Järnhäll. *Modern Packaging,* v. 29, May 1956, p. 163 + 9 pages.

A method of quickly determining the electrolyte content of a packaging material as an index of the material's corroding properties. Diagram, photographs, graphs, tables. 11 ref. (R10)

289-R. Galvanic Corrosion Properties of Titanium and Zirconium in Various Inorganic Solutions. David Schlain, C. B. Kenahan and Doris V. Steele. *U. S. Bureau of Mines, Report of Investigations 5201,* Apr. 1956, 60 p.

Behavior in contact with some of the common structural metals in several types of inorganic solutions. Diagram, photographs, tables, graphs. 30 ref. (R5, R1, Zr, Ti)

290-R. (English.) **The Rates of Oxidation of Several Faces of a Single Crystal of Copper as Determined With Elliptically Polarized Light.** Fred W. Young, Jr., John V. Cathcart and Allan T. Gwathmey. *Acta Metallurgica,* v. 4, no. 2, Mar. 1956, p. 145-152.

Rates of oxidation determined at 70, 106, 130, 159 and 178° C. by measuring the increase in thickness of the oxide film as a function of time, using a polarizing spectrometer. Photograph, table, diagrams, graphs. 16 ref. (R2, Cu)

291-R. (French.) **Cu_2O and ZnO Single Crystal Formation by Selective Oxidation of an α-Brass Film, Prepared by Vacuum Evaporation.** N. Takahashi and J. J. Trillat. *Acta Metallurgica,* v. 4, no. 2, Mar. 1956, p. 201-205.

Thin films were prepared under vacuum by successive deposition of copper and zinc, oxidized by heating in the specimen chamber of the electron diffraction unit and studied with respect to processes of selective oxidation. Diagrams, diffractograms. 10 ref. (R2, L25, Zn, Cu)

292-R. (German.) **Oxidation of Carbide Alloys for Use at High Temperatures.** Josef Hinnüber, Otto Rüdiger and Willi Kinna. *Archiv für das Eisenhüttenwesen,* v. 27, no. 4, Apr. 1956, p. 259-267.

Effect of tungsten, chromium or tantalum-columbium carbide additions on the oxidation ratio and oxide-layer formation of titanium carbide-cobalt alloys in up to 75 hr. at 800 to 1100° C. Table, graphs, diagram, micrographs, photographs. 13 ref. (R2, Ti, Co, C-n)

293-R. (German.) **Scale Formation of Sintered Materials on a Silver Base.** Albert Keil. *Zeitschrift für Metallkunde,* v. 47, no. 4, Apr. 1956, p. 243-246.

The use of carbides and borides as nonoxidizing components of silver sinter materials for contacts instead of the pure metals molybdenum and tungsten offers no advantages with regard to scaling properties. Graphs, micrograph. 10 ref. (R2, SG-r, C-n, Mo, W)

294-R. (Hungarian.) **New Method for the Direct Microscopic Observation of Electrolytic and Corrosion Processes.** Erik Fuchs and Tibor Baumann. *Kohaszati Lapok,* v. 11, no. 3, Mar. 1956, p. 107-112.

Application of "Reichert MeF" microscope in combination with test vessels. Diagrams, photographs, micrographs. 4 ref. (R11)

295-R. (Italian.) **First Stages of Zinc Surface Oxidation (0001).** G. P. Bolognesi. *Metallurgia Italiana,* v. 48, no. 3, Mar. 1956, p. 119-123.

Investigates the oxidation and its characteristics by gas-volumetric measurements and reaction potentials. Tables, graphs, diagram. 14 ref. (R2, Zn)

296-R. A Systematic Scheme for Examining Corroded Metal Specimens. J. B. Cotton. *Corrosion Technology,* v. 3, May 1956, p. 141-145.

Procedure using diverse techniques such as microchemical analysis, X-ray examination and metallography to study corrosion failure. Micrographs, diagrams, photographs. (R11)

297-R. The Composition and Reduction of Oxide Films on Copper. R. F. Tylecote. *Metallurgia,* v. 53, no. 319, May 1956, p. 191-197.

Reduction rate of cupric and cuprous oxide to copper; mechanism of oxidation and reduction. Photograph, graphs, tables. 12 ref. (R2, Cu)

298-R. Corrosion Resistance of Titanium. Andrew N. Eshman. *Product Engineering,* v. 27, June 1956, p. 187-189.

Resistance to galvanic, marine and chemical attack; comparison with stainless steel and aluminum for a wide range of chemicals. Tables, photographs. (R general, Al, SS, Ti)

299-R. (English.) **Corrosion as an Electrochemical Process.** Herbert H. Uhlig. *Electrochemical Society, Bulletin of India Section,* v. 5, no. 1, Jan. 1956, p. 11-14.

Theoretical considerations. Graphs, tables. 3 ref. (R1)

300-R. (Czech.) **The Influence of Titanium on the Intergranular Corrosion of 18% Cr, 9% Ni Stainless Steel.** Vladimir Cihal, Rudolf Pospisil. *Hutnické Listy,* v. 11, no. 5, May 1956, p. 284-290.

At a superstoichiometric titanium content the quantity of ferrite in 18-9 steels increases. The ferrite decomposes in a brittle sigma phase

at temperatures below 800°C. Tables, graphs, photographs, micrographs. 10 ref. (R2, N8, SS, Ti)

301-R. (French.) **Contribution to the Study of Corrosion of Steel in Saline Solutions.** A. Hache. *Revue de Métallurgie,* v. 53, no. 1, Jan. 1956, p. 76-79; disc., p. 80.

Influence of temperature and salinity studied according to the dissolved oxygen existing in the saline solutions. Diagram, graphs, table. 4 ref. (R5, ST)

302-R. (French.) **Microstructure of a Brittle Beta-Brass With 3.99% Aluminum.** A. R. Bailey and C. Robins. *Revue de Métallurgie,* v. 53, no. 2, Feb. 1956, p. 105-110; disc., p. 110.

Review of literature on intercrystalline stress-cracking of high-tensile β-brasses; detection, by electrolytic polishing methods, of grain boundary grooves in cast and heat-treated specimens of a ternary β-brass. Micrographs. 16 ref. (R1, M27, Cu)

303-R. (German.) **Corrosion and Corrosion Testing.** Bruno Waeser. *Werkstoffe und Korosion,* v. 7, no. 5, 1956, p. 256-261.

Definition of corrosion is extended to materials such as wood, stone, metals and plastics. Crystal lattice constants and quotients of volume are characterizing values for the behavior of metal in air. 55 ref. (R1, R3, R11)

304-R. (Italian.) **Phenomenon of Cavitation.** L. C. Burrill. *Tecnica Italiana,* v. 21, no. 2, Mar. 1956, p. 95-103.

Physical nature, effects of localized erosion and vibrations and noises caused by cavitation. Some recent experiences and methods of avoiding cavitation. Photographs, diagrams. (R2)

305-R. (Russian.) **Study of the Mechanism of Action of Anticorrosive Additives in Oils With the Aid of Tracer Atoms.** Iu. S. Zaslavskii, S. E. Krein, R. N. Shneerova and G. I. Shor. *Khimiia i Teknolgiia Topliva,* no. 4, Apr. 1956, p. 37-49.

A study of the anticorrosive mechanism of alkyl-phenol additives tagged with radioactive sulfur. The protective action of anticorrosive additives is counteracted by the oil whose increasing acidity tends to destroy the protective film formed by the additive on the surface of the metal. Table, graphs. 14 ref. (R10)

306-R. (Slovak.) **Corrosion in Welded Constructions.** Kazimir Pospiech. *Zvaranie,* v. 4, no. 12, Dec. 1956, p. 368-373.

Corrosion of welded structures under actual industrial conditions. Laboratory corrosion tests; electrochemical measurements; effect of impurities and microstructure. Tables, graphs, photographs, diagram. 21 ref. (R general, M27, Fe, ST)

307-R. (Book-French.) **Stainless and Refractory Steels.** L. Colombier and J. Hochmann. 526 p. 1955. Dunod, 92 rue Bonaparte, Paris 6, France.

General properties and corrosion resistance of stainless steels and the main refractory steels and alloys. Methods of corrosion testing and the action of various corrosive mediums. Chemical and mechanical resistance at high temperatures. Production processes and applications.

(R general, Q general, SS)

308-R. Corrosion Studies Pertinent to Bromine Trifluoride Processes. J. G. Schnizlein, R. K. Steunenberg and R. C. Vogel. *Argonne National Laboratory (U. S. Atomic Energy Commission),* ANL-5557, Apr. 1956, 27 p.

The corrosion rates of certain metals and alloys were determined in several solutions typical of bromine trifluoride processes. Photographs, tables, graphs, diagram. 3 ref. (R5, Al, Mg, ST, Ag, Ni)

309-R. All-Glass Multiple-Test Apparatus for Corrosion Testing of Stainless Steels. J. V. Alger, E. C. Roberts, R. P. Lent and G. W. Anderton. *ASTM Bulletin,* no. 214, May 1956, p. 57-60.

Apparatus appears to be capable of fulfilling a role in the field of quality control of corrosion resistant steels and has advantages of convenience of operation, adaptability and lowered construction cost. Diagrams, graphs, tables. 4 ref. (R11, SS)

310-R. A New Atmospheric Cycling Test for Corrosion Study. T. J. Nussdorfer and D. O. White. *ASTM Bulletin,* no. 214, May 1956, p. 61-65.

Apparatus designed to simulate the daily cycling of atmospheric conditions was used to evaluate volatile corrosion inhibitors and preservative oils in reciprocating and turbojet engines. Graphs, photographs. 7 ref. (R11, R10)

311-R. Zinc Anodes for Ships. H. S. Preiser. *Bureau of Ships Journal,* v. 2, June 1956, p. 15-17.

Iron impurity was found to be the controlling factor in the ability of zincs to sustain continuous activity.

Maximum iron that can be tolerated is 0.0014%. Diagrams, graph. (R10, Zn)

312-R. Waterside Corrosion in Naval Boilers. W. Tessin. *Bureau of Ships Journal,* v. 2, June 1956, p. 18-20.

Dissolved oxygen, main cause of corrosion, can be eliminated by mixing with superheated steam. Photographs. (R4)

313-R. Corrosion in Caustic of Nickel-Iron Welds Obtained in Fabrication of Nickel-Clad Vessels. Paul J. Gegner. *Corrosion,* v. 12, June 1956, p. 261-262.

Tests indicate that in nickel-clad vessels for caustic service, iron can be tolerated in the welds up to about 25% insofar as corrosion is concerned. Tables. (R5, Ni, Fe)

314-R. Corrosion Testing of Aluminum. I. High Velocity Test Method in Aqueous Solutions. Sumner B. Twiss and Jack D. Guttenplan. *Corrosion,* v. 12, June 1956, p. 263-269; disc., p. 270.

A technique involving spinning of aluminum disks in aqueous solutions at high velocities was used to investigate the effect of various natural waters and antifreezes on aluminum corrosion. Table, graphs, diagram, photographs, micrograph. 8 ref. (To be continued.) (R11, R5, Al)

315-R. Iron in Oil Technique as a Corrosion Control Criterion. R. G. Rydell and W. H. Rodewald. *Corrosion,* v. 12, June 1956, p. 271-276.

The Walker-Robertson method of determining the amount of iron in oil is suitable for processing a relatively large number of samples with acceptable accuracy; appears to be valuable corrosion control criterion for sour wells. Tables, photographs. (R10, Fe)

316-R. A Radiochemical Tracer Investigation of the Role of Mercury in the Corrosion of Aluminum. R. C. Plumb, M. H. Brown and J. E. Lewis. *Corrosion,* v. 12, June 1956, p. 277-285.

Technique permitting accurate quantitative measurements of mercury pickup. Mechanism by which aluminum corrodes in a solution of mercuric salt. Technique for removing mercury contamination from aluminum. Photographs, table, diagrams, graphs, autoradiograms. 6 ref. (R5, R11, Hg, Al)

317-R. Inhibiting Corrosion of Steel, Aluminum, and Magnesium Intermittently Exposed to Brines. George E. Best and John W. McGrew. *Corrosion,* v. 12, June 1956, p. 286-292.

Chromate effectively minimizes corrosion of mild steel and selected aluminum and magnesium alloys at ordinary temperatures. Graphs, tables, diagrams. 9 ref. (R10, R5, ST, Al, Mg)

318-R. The Scaling of Titanium and Titanium-Base Alloys in Air. Hal W. Maynor, Jr., and Roy E. Swift. *Corrosion,* v. 12, June 1956, p. 293-304.

Scaling tendencies of various alloys relative to titanium and stainless steel evaluated on the basis of weight gain with time. Isothermal transitions in scaling rate were observed within the temperature range from 1200 to 1600° F. Graphs, diagrams, photographs, tables. 11 ref. (R3, Ti)

319-R. High Pressure Oxidation of Niobium. Donald W. Bridges and W. Martin Fassell, Jr. *Electrochemical Society, Journal,* v. 103, June 1956, p. 326-330.

Niobium oxidizes according to the linear rate law from 400-800° C. The oxidation rate is extremely pressure sensitive above 550° C. Tables, graphs. 18 ref. (R2, Cb)

320-R. Inhibition of Iron Dissolution in Acid Solutions. Cecil V. King and Eric Rau. *Electrochemical Society, Journal,* v. 103, June 1956, p. 331-337.

Inhibition of iron dissolution from rotating cylinders studied in solutions of dilute hydrochloric or perchloric acid with excess nitrate as depolarizer. No better over-all oxidizing inhibitor than dichromate was found. Photographs, graphs, tables. 23 ref. (R10, R5, Fe)

321-R. Cathodic Protection Reaches Up to Cover the Splash Zone. Maurice A. Riordan. *World Oil,* v. 142, June 1956, p. 250 + 4 pages.

A jacket made from molding plaster, gypsum and fresh water creates an environment that will support proper current flow. Photographs, diagrams. 1 ref. (R10)

322-R. Continuous Dissolution of Uranium-Aluminum Reactor Fuels. A. F. Boeglin, J. A. Buckham, L. Chajson, R. B. Lemon, D. M. Paige and C. E. Stoops. *A.I.Ch.E. Journal,* v. 2, June 1956, p. 190-194.

Extensive pilot plant studies of the continuous mercury-catalyzed nitric acid dissolution of uranium-aluminum alloy materials similar to possible reactor fuel elements were carried out. (R2, U, Al)

323-R. Apparatus for Visual Study of Corrosion by Hot Water. Daniel R.

Grieser and Eugene M. Simons. *A.I.Ch.E. Journal,* v. 2, June 1956, p. 215-218.

A windowed autoclave was designed to provide a pictorial representation of the corrosion phenomenon while it is occuring. The instrument affords a relative evaluation of the influence of such variables as geometry, alloying, type of bonding, water temperature and water impurities on corrosion rate. (R4, R11)

324-R. Corrosion Problems in Oil Refining. R. M. Robb. *Australasian Engineer,* v. 48, Apr. 1956, p.48-53.

Basic mechanism of corrosion resulting from petroleum products; general corrosion economy and refinery technology; common methods of prevention. (R7)

325-R. The Corrosion of Cast Iron. R. I. Higgins. *British Cast Iron Research Association, Journal of Research and Development,* v. 6, Feb. 1956, p. 165-177 + 2 plates.

The behavior and suitability of different types of cast iron in various conditions and media of corrosion. (R general, CI)

326-R. Electrode Potentials and the Dissolution of Gold. G. Thomas. *Canada, Department of Mines and Technical Surveys, Mines Branch, Technical Paper No.* 9, 1954, 14 p.

The potential of a metal electrode in a cyanide solution depends not only on the cyanide concentration, but also on pH, on the amounts of dissolved gold and oxygen, and on salts which may be present. (R2, P15, Au)

327-R. Corrosion Experience With a Modern Salt Evaporator. R. B. Richards. *Chemical Engineering Progress,* v. 52, June 1956, p. 58, 62.

Corrosion at tube junctions with the head resulting from insufficient rolling complicated this new and otherwise successful installation. (R5)

328-R. Corrosion Keys. Aluminum. R. S. Dalrymple. *Chemical Processing,* v. 19, July 1956, p. 80.

Data on corrosion rates with various chemicals. (R5, Al)

329-R. Corrosion and Construction Problems of Sulphuric Acid Plant. G. C. Lowrison and F. Heppenstall. *Corrosion Technology,* v. 3, June 1956, p. 174-180.

Methods and materials of construction used in the manufacture of sulphuric acid from the handling and storage of raw materials to the acid concentration stage. (R6, R5, T29)

330-R. Corrosion of Packaged Articles. F. A. Paine. *Corrosion Technology,* v. 3, June 1956, p. 191-193.

Factors influencing selection of packaging method. (R10)

331-R. Spread of Protection. J. H. Morgan. *Corrosion Technology,* v. 3, June 1956, p. 194-196.

Analysis of three types of control ensuring complete cathodic protection. (R10)

332-R. Paint-Zinc Combinations for Corrosion Protection of Iron & Steel. E. E. Halls. *Electroplating and Metal Finishing,* v. 9, June 1956, p. 186-187.

Results of outdoor exposure tests. (R3, L26, Zn, Fe, ST)

333-R. Interaction of Chromium (VI) Anions With Chromium Metal Surfaces. Sherman Kottle and L. O. Morgan. *Journal of Physical Chemistry,* v. 60, June 1956, p. 738-741.

Electrode potential changes are correlated with adsorption chromium anions on a chromium metal surface. Three classes of chromium metal surfaces were recognized. (R5, L17, Cr)

334-R. Corrosion as It Affects Insulator and Conductor Hardware. A. W. Bardeen and J. M. Sheadel. *Power Apparatus and Systems,* no. 24, June 1956, p. 491-498; disc., p. 498-501.

The different types of corrosion observed on insulators and hardware of power lines described and classified; remedial measures suggested. (R3)

335-R. Study of the Feasibility of Aqueous Recovery of Spent Fuels. I. Dissolution Experiments on Alloy Samples. Philip J. Elving, John L. Griffin and John O. Larson. *University of Michigan, Engineering Research Institute, (U. S. Atomic Energy Commission),* AECU-3160, June 1954, 20 p.

Variation of extent of dissolution; time required for complete disintegration and completion of dissolution; kinetic experiments. (R2)

336-R. (Czech.) **Corrosion Protection of Parts by Means of Vapor-Phase Inhibitors.** L. Cerveny. *Strojirenstvi,* v. 6, no. 1, Jan. 1956, p. 44-47.

Properties and technology of vapor-phase inhibitors. Tests of the effectiveness of dicyclohexylaminenitrite as a rust inhibitor, under chemical industry, marine, and other conditions. (R10)

337-R. (Dutch.) **I. Theory of Electrochemical Corrosion of Metals. II. Review of Methods for Combatting It.** J. W. Boon. *Metaalinstituut T. N. O.,* no. 36, Oct. 1955, p. 687-696.

Electrochemical corrosion fundamentals; methods of corrosion prevention; metal passivation. (R1, R10)

338-R. (Dutch.) **Corrosion Tests With Aluminum Alloys.** E. M. J. Mulders, W. G. R. de Jager and J. W. Boon. *Metaalinstituut T. N. O.*, no. 25, Feb. 1956, p. 44-58.

Outdoor exposure tests and laboratory tests were performed with a large number of specimens bonded by various methods as well as with aluminum alloys combined with steel. (R3, ST, Al)

339-R. (Dutch.) **Cathodic Protection of Underground Pipe Lines.** J. F. Bogtstra and M. Oudeman. *Metaalinstituut T. N. O.*, no. 35, July 1955, 41 p.

Electrochemical attack and other factors affecting the corrosion of pipe lines. (R10)

340-R. (French.) **A Survey of Recent Work of the Corrosion Committee of the Association Belge pour l'Etude, l'Essai et l'Emploi des Matériaux (A.B.E.M.).** G. Depireux. *Acier, Stahl, Steel,* v. 21, no. 5, May 1956, p. 220-224.

Work has been directed chiefly towards protection of metal structures against atmospheric corrosion, and is based mainly on natural aging tests. (R3)

341-R. (German.) **Our Contemporary Conception of Electrochemical Mechanism of Corrosion.** I. W. Schwarz. *Metall,* v. 10, nos. 11-12, June 1956, p. 513-519.

Chemical and electrochemical corrosion; physical and chemical effects; hydrogen and oxygen corrosion. (R1)

342-R. (German.) **Corrosion, Fissuring, and Erosion of the Outside Surface of Copper Alloy Condensers. I.** F. W. Nothing. *Metall,* v. 10, nos. 11-12, June 1956, p. 520-523.

Corrosion produced by condensates or cooling agents. General material wear. Selective corrosion. (R2, R4, Cu)

343-R. (Hungarian.) **Electrochemical Investigation of the Corrosion Resistance of Tin Coatings.** Mihaly Solti, Laszlo Kiss and Antal Vigh. *Magyar Kemiai Folyoirat,* v. 62, no. 4, Apr. 1956, p. 130-135.

An electrographic method using fixed photographic paper was developed to determine porosity of tin coatings, to predict corrosion resistance. Tin plate corrodes in sodium chloride and acetic acid solutions. (R11, R5, L16, Sn)

344-R. (Russian.) **The Kinetics of Cathodic Processes Involved in the Corrosion of Metals in the Soil.** N. D. Tomashov and Iu. N. Mikhailovskii. *Doklady Akademii Nauk SSSR,* v. 107, no. 6, June 1956, p. 853-856.

Study of migration of oxygen in soil yields quantitative data for determining rate of cathodic processes responsible for corrosion of metals in various soils. (R8)

345-R. (Russian.) **The Corrosion of Lead in Sulfuric Acid as Influenced by the Structure of the Metal.** M. A. Dasoian. *Doklady Akademii Nauk SSSR,* v. 107, no. 6, June 1956, p. 863-866 + 1 plate.

Experimental data on the mechanism of action of various anticorrosion additives in lead. (R5, R6, Pb)

346-R. (Russian.) **Rust Inhibitors in Lubricating Oils for Periodically Operated Working Machines.** B. V. Losikov and L. A. Aleksandrova. *Vestnik Mashinostroeniia,* v. 36, no. 5, May 1956, p. 12-15.

An experimental study of a number of rust-preventing additives for lubricating oils. Efficacy of the additives depends on the shape and positions of parts lubricated. (R10)

347-R. (Russian.) **Investigation of the Corrosion Resistance of Solid Solutions of Metals. I. The System In-Pb.** N. N. Gratsianskii and M. L. Kaplan. *Zhurnal Fizicheskoi Khimii,* v. 30, no. 3, Mar. 1956, p. 651-659.

In the case of low-melting solid solutions in which at room temperature the atoms possess a high diffusion velocity, a limit is observed to the corrosion resistance. (R5, N12, In, Pb)

348-R. (Russian.) **A Study of Metal Corrosion With the Aid of the Heavy Oxygen Isotope. I. Moist Atmosphere Corrosion of Iron.** A. I. Brodskii, A. S. Fomenko and T. M. Abramova. *Zhurnal Fizicheskoi Khimii,* v. 30, no. 3, Mar. 1956, p. 676-684.

Role of electrochemical and chemical mechanisms in the moisture corrosion of iron. (R11, R5. R1, Fe)

349-R. (Ukrainian.) **Changes in the Corrosion Reesistance of Hardened Steel Due to Annealing.** K. F. Starodubov and S. G. Cherniavs'ka. *Dopovidi Akademii Nauk, Ukrains'koi RSR,* 1956, no. 2, p. 140-142.

Experimental data on variation of corrosion resistance of carbon steel with temperature of annealing. Corrosion curve shows two sharp maxima at about 275 and 400° C. (R general, J23, CN)

350-R. Suggested Nontechnical Manual on Corrosion for Water Works Operators. Lee B. Hertzberg. *American Water Works Association, Journal,* v. 48, June 1956, p. 719-738.

Types of corrosion, costs, insulation, pipe fittings, painting and coating, bonding, cathodic protection and pipeline selection. (R4, R10, L26)

351-R. Kinetics of the Reaction Between Thorium and Water Vapor. Bruce E. Deal and Harry Svec. *Ames Laboratory (U. S. Atomic Energy Commission),* ISC-653, June 1955, 50 p.

Examination of the reaction between 200 and 600° C. and at water vapor pressures of 40, 70, and 100 m.m. hg. Photo. (R4, Th)

352-R. Stress-Corrosion Cracking Test. A. W. Dana and W. B. DeLong. *Corrosion,* v. 12, July 1956, p. 309T-310T.

Experimental apparatus and procedure for studying effect of thermal insulation on cracking of austenitic stainless steel equipment. (R1, SS)

353-R. Corrosion Testing of Aluminum. II. Development of a Corrosion Inhibitor. Samner B. Twiss and Jack D. Guttenplan. *Corrosion,* v. 12, July 1956, p. 311T-315T; disc., p. 315T-316T.

An accelerated corrosion test was used to test effectiveness of various corrosion inhibitors in tap water. Soluble oil was most effective. (R11, R10, Al)

354-R. The Cathodic Protection of Metallic Structures in Marine Environments. W. A. Bowen, Jr. *Corrosion,* v. 12, July 1956, p. 317T-321T.

Theoretical and practical considerations involved, including anode location, polarization, economics and other factors. Methods of checking the effectiveness of cathodic protection. Automatic control system. (R10)

355-R. Cathodic Protection of Lead Cables in an Urban Area. L. M. Plym. *Corrosion,* v. 12, July 1956, p. 331T-335T.

Establishment of a protection system for lead covered telephone cables. Practical applications for system arrangements: distributed ground beds, forced current through a drainage system, distributed negative connections to several underground cables and duct anodes. (R10, Pb)

356-R. Fundamentals of Liquid Metal Corrosion. W. D. Manly. *Corrosion,* v. 12, July 1956, p. 336T-342T.

Types of corrosion, influencing variables, role of impurities, mass transfer. (R6)

357-R. The Effect of Iron in Galvanic Zinc Anodes in Sea Water. R. B. Teel and D. B. Anderson. *Corrosion,* v. 12, July 1956, p. 343T-349T.

Zinc containing an iron concentration higher than 0.0015% will develop a high resistance corrosion product film which will render the zinc less effective as an anode material. (R10, Fe, Zn)

358-R. Use of Organic Corrosion Inhibitor in Refining Processes. Charles Fiske and Paul Mernitz. *Corrosion,* v. 12, July 1956, p. 350T-354T.

Use of 6-8 p.p.m. of inhibitor has extended life of tower several years beyond that expected with ammonia protection alone. (R10)

359-R. Cathodic Protection of Lead Sheathed Cables in the Utilities Industry. *Corrosion,* v. 12, July 1956, p. 355T-370T.

Replies to two questionnaires concerning lead and copper-jacketed cables are summarized. Includes protective criteria, ground bed design and location, power source, insulating joints and protective coatings. Table, graphs. 5 ref. (R10, Pb)

360-R. A Nondestructive Test for Intergranular Corrosion in Stainless Steel Tubing. R. C. Robinson. *E. I. du Pont de Nemours & Co., Savannah River Laboratory Technical Division (U. S. Atomic Energy Commission),* DP-153, Mar. 1956, 15 p.

An eddy current instrument which indicates the relative degree of intergranular corrosion present in austenitic stainless steel tubes. (R11, R2, SS)

361-R. High Temperature Scaling of Nickel-Manganese Alloys. E. B. Evans, C. A. Phalnikar and W. M. Baldwin, Jr. *Electrochemical Society, Journal,* v. 103, July 1956, p. 367-375.

At a given temperature, the scaling rate increased with increasing additions of manganese. Composition of both the external and subscale was dependent on alloy composition and temperature. (R2, Ni, Mn)

362-R. Pitting Corrosion of 18Cr-8Ni Stainless Steel. M. A. Streicher. *Electrochemical Society, Journal,* v. 103, July 1956, p. 375-390.

Factors controlling pitting corrosion and laboratory methods used for its study. Influence of alloying elements added to 18 Cr-8 Ni stainless steel on pit initiation in sodium chloride and bromide solutions. (R11, R5, R2)

363-R. Studies of the Corrosion Resistance of Titanium Alloys I. Corrosion Resistance of Ti-Al and Ti-Ni Alloys. Susumu Yoshida, Shigetake Okamoto and Takashi Araki. *Journal of Mechanical Laboratory (Japan),* v. 1, 1955, p. 33-34.

Corrosion rates were determined in various test solution at ordinary and boiling temperatures. (R5, R11, Ti)

364-R. Corrosion Resistance of Aluminum Alloys. F. M. Reinhart and G. A. Ellinger. *Light Metal Age,* v. 14, June 1956, p. 16-17.

Effects of composition, heat treatment and protective coatings on corrosion rates. (R3, Al)

365-R. Effect of Hardening and Tempering on the Corrosion Resistance of 13%-Cr Steel. E. A. Oldfield and G. B. Graves. *Metal Treatment and Drop Forging,* v. 23, June 1956, p. 211-215.

Influence of tempering time and temperature on resistance to corrosion by a dilute aqueous solution of nitric and hydrochloric acids. (R5, Q29, J29, AY-c)

366-R. Oxidation Characteristics of the Alkali Metals. I. Oxidation Rate of Sodium Between −79 and 48° C. J. V. Cathcart, L. L. Hall and G. P. Smith. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission),* ORNL-2054, June 1956, 7 p.

The reaction rate in dry oxygen was found to be small, and the oxide films were highly protective. The observed oxidation data could not be fitted to any of the conventional oxidation rate equations. (R2, EG-e)

367-R. (Russian.) **Causes of Fissure Formation in E1257 Steel Pipes of Steam Superheaters.** L. P. Trusov, L. P. Nikitina and G. A. Tuliakov. *Metallovedenie i Obrabotka Metallov,* 1956, no. 5, May 1956, p. 27-33.

Mechanism of fissure formation in pipes of certain types of steam superheaters operating under irregular conditions. (R1, AY)

368-R. (Pamphlet.) **Literature Survey of the Corrosion Behavior of Tantalum, Zirconium, and Titanium.** R. A. Perkins. 23 p. 1955. Metals Research Laboratories, Electro Metallurgical Co., Niagara Falls, N. Y.

Applications of tantalum in chemical equipment and corrosion applications probably will depend to a large extent on other metals which can compete in specific applications. Notable among these are titanium and zirconium, both of which exhibit exceptionally good corrosion resistance to a wide variety of chemicals and are available at far less cost. A search of the literature has been made to determine the specific fields in which each excels and those in which they compete. Typical data on corrosion behavior are summarized in this report. (R general, Ta, Zr, Ti)

369-R. Stress-Corrosion of Stainless Boilers. (Digest of "Stress Corrosion of Austenitic Stainless Steels in High Temperature Waters), by W. Lee Williams and John F. Eckel, *American Society of Naval Engineers, Journal,* v. 68, Feb. 1956, p. 93-104. *Metal Progress,* v. 70, July 1956, p. 152, 154, 156.

Oxygen with a chloride-ion content is especially bad in the steam phase on areas under mild stress, whereas oxygen alone gives little trouble. Controls described. (R1, SS)

370-R. Corrosion Problems Arising From the Use of Aluminium Alloys in H.M. Ships. I. J. C. Kingcome. *Corrosion Prevention and Control,* v. 3, June 1956, p. 31-34,

With cathodic protection it should be possible not only to prevent the corrosion of aluminum alloys in contact with copper alloys in sea-water, but to use copper-containing aluminum alloys for constructional purposes and so benefit from the much superior mechanical properties of these alloys. (To be continued.) (R10, R4, L26, Q general, Cu, Al)

371-R. Corrosion Control in Tankers by Cathodic Protection. J. S. Gerrard. *Corrosion Prevention and Control,* v. 3, June 1956, p. 37-38.

On a new ship, cathodic protection will be 80-90% effective. (R10)

372-R. Cathodic Protection and Shipping—Practical Considerations. A. W. Hubbard. *Corrosion Prevention and Control,* v. 3, June 1956, p. 47-49.

Application to tanker cargo-ballast compartments and to hull surfaces. Limitations of the galvanic system. (R10)

373-R. Corrosive and Erosive Effects of Acid Mine Waters on Metals and Alloys for Mine Pumping Equipment and Drainage Facilities. Anthracite Region of Pennsylvania. S. H. Ash, H. A. Dierks, E. W. Felegy, K. M. Huston, D. O. Kennedy, P. S. Miller and J. J. Rosella. *U. S. Bureau of Mines Bulletin 555,* 46 p. 1955.

Quality and character of anthracite mine waters, results of various corrosion tests, materials suitable for pumping equipment. (R4)

374-R. Mechanism of Water Pipe Corrosion. Rolf Eliasson and James C. Lamb, III. *Water & Sewage Works (Reference and Data Edition),* v. 103, June 1956, p. R99-R104.

Variables affecting rate and distribution of pipeline corrosion. Formation of corrosion cells. (R1, R4)

375-R. Report of Subcommittee VI, of Committee B-3, on Atmospheric Corrosion. H. R. Copson, chairman. Paper from "Symposium on Atmospheric Corrosion of Non-Ferrous Metals". ASTM Special Publication No. 175. American Society for Testing Materials. p. 3-19.

Tabulated data on 24 nonferrous metals and alloys which were exposed to the atmosphere at seven locations. (R3)

376-R. Resistance of Aluminum-Base Alloys to 20-Year Atmospheric Exposure. C. J. Walton and William King. Paper from "Symposium on Atmospheric Corrosion of Non-Ferrous Metals". ASTM Special Publication No. 175. American Society for Testing Materials. p. 21-44, disc., p. 45-46.

Discussion of 20-yr. atmospheric weathering data obtained on wrought aluminum-base alloys. Data correlated with more recent findings. (R3, Al)

377-R. Effect of 20-Year Marine Atmosphere Exposure on Some Aluminum Alloys. Fred M. Reinhart and George A. Ellinger. Paper from "Symposium on Atmospheric Corrosion of Non-Ferrous Metals". ASTM Special Publication No. 175. American Society for Testing Materials. p. 47-64, disc., p. 65-66.

Tests on specimens of commercially available structural aluminum alloys. Data of three locations correlated. (R3, Al)

378-R. Effect of Natural Atmospheres on Copper Alloys: 20-Year Test. A. W. Tracy. Paper from "Symposium on Atmospheric Corrosion of Non-Ferrous Metals". ASTM Special Publication No. 175. American Society for Testing Materials. p. 67-76.

The corrosion resistance of 11 copper alloys exposed to industrial, marine and rural atmospheres. (R3, Cu)

379-R. The Atmospheric Corrosion of Copper—Results of 20-year Tests. D. H. Thompson, A. W. Tracy and John R. Freeman, Jr. Paper from "Symposium on Atmospheric Corrosion of Non-Ferrous Metals". ASTM Special Publication no. 175. American Society for Testing Materials. p. 77-87.

Copper, in the form of sheet and wire, was exposed to four outdoor atmospheres in Connecticut and the effect of corrosion was evaluated. (R3)

380-R. Atmospheric Galvanic Corrosion of Magnesium Coupled to Other Metals. H. O. Teeple. Paper from "Symposium on Atmospheric Corrosion of Non-Ferrous Metals". ASTM Special Publication No. 175. American Society for Testing Materials. p. 89-115.

A total of 480 couples arranged in the forms of disks evaluated in four different locations. (R3, R1, Mg)

381-R. Galvanic Couple Corrosion Studies by Means of the Threaded Bolt and Wire Test. K. G. Compton and A. Mendizza. Paper from "Symposium on Atmospheric Corrosion of Non-Ferrous Metals". ASTM Special Publication No. 175. American Society for Testing Materials. p. 116-123; disc., p. 124-125.

Concludes that no very broad generalization can be made as to the relative severity of dissimilar-metal galvanic-couple corrosion; corrosion rate seems to be an arbitrary value. (R1, R3, R11)

382-R. The Atmospheric Corrosion of Rolled Zinc. E. A. Anderson. Paper from "Symposium on Atmospheric Corrosion of Non-Ferrous Metals". ASTM Special Publication No. 175. American Society for Testing Materials. p. 126-134.

Atmospheric corrosion of zinc is controlled principally by the frequency of rain and dewfall, the acidity of the moisture and the rate of drying. (R3, Zn)

383-R. The Use of Lead and Tin Outdoors. George O. Hiers and Elbert J. Minarcik. Paper from "Symposium on Atmospheric Corrosion of Non-Ferrous Metals". ASTM Special Publication No. 175. American Society for Testing Materials. p. 135-140.

Corrosion penetration showed chemical lead and antimonial lead are remarkably durable in all of the test site exposures. Losses in strength can be compensated. (R3, T26, Pb, Sn)

384-R. Atmospheric Corrosion Behavior of Some Nickel Alloys. H. R. Copson. Paper from "Symposium on Atmospheric Corrosion of Non-Ferrous Metals". ASTM Special Publication No. 175. American Society for Testing Materials. p. 141-158.

High-nickel alloys are very resistant to corrosion at marine and rural locations. (R3, Ni)

385-R. (Dutch.) **Cathodic Protection.** J. W. Boon. *Metalen,* v. 8, no. 10, May 31, 1956, p. 219-226.

Principle of cathodic protection, electrical and electrochemical considerations, galvanic method, reactions at the anode and cathode, criteria of complete protection, advantageous and deleterious secondary effects and practical results of application. (R10)

386-R. (Dutch.) **Corrosion Investigation by Means of Aerosols.** W. Hess-Bircher. *Metalen,* v. 11, no. 11, June 15, 1956, p. 239-245.

Physical basis of method. Practical tests. (R11)

387-R. (French.) **Observations of the Attack Mechanisms on High-Purity Aluminum by Water at High Temperature.** Jean Herenguel and Pierre Lelong. *Comptes Rendus,* v. 242, no. 25, June 18, 1956, p. 2941-2944.

Micrographic study of attack mechanisms on high-purity metal by water at 165 and 205° C. after electrolytic or chemical polishing. (R1, R4, Al)

388-R. (German.) **Stabilizing of Passive State of Austenite Chromium-Nickel Steels by Means of Anodic Polarization in Boiling 4N Sulfuric Acid.** Carl Carius. *Archiv für das eisenhüttenwesen,* v. 27, no. 6, June 1956, p. 401-412.

Potential measurements in oxygen-containing 4N sulfuric acid at room temperature and the boiling point. Study of passivation. (R10, SS)

389-R. (German.) **Corrosion and Corrosion Protection in Mining—Protection by Coal-Tar Products.** Franz Eisenstecken. *Werkstoffe und Korrosion,* v. 7, no. 6, June 1956, p. 310-321.

General corrosion problems, especially the harmful effect of mill scale on rolled or tempered iron and steel in relation to tar coating. (R7, L26, ST)

390-R. (German.) **Corrosion by Sulfuric Acid.** Johannes Bünger. *Werkstoffe und Korrosion,* v. 7, no. 6, June 1956, p. 322-330.

Corrosion resistance graphs for chromium, nickel, molybdenum, copper, steels and nickel-molybdenum alloy for a range of temperature up to boiling and concentration up to 95% sulfuric acid. (R6, AY)

391-R. (Russian.) **Dependence of the Cavitation Coefficient of the Hydraulic Turbine on the Soluble Air Content in Water.** L. S. Shmugliakov. *Energomashinostroenie,* no. 5, May 1956, p. 11-14.

Experimental data on the effect of dissolved air on the development of cavitation. Derivation of formulas relating the cavitation coefficient of a hydraulic turbine to the soluble air content of water. (R2)

392-R. A Study of the Reaction of Metals and Water. H. M. Higgins. *Aerojet-General Corporation, U. S. Atomic Energy Commission, AECD-*3664, Apr. 1955, 59 p.

Reactions of molten zirconium, Zircaloy-2, uranium, uranium-molybdenum alloy, aluminum, aluminum-lithium alloy and magnesium. (R4, P13, Zr, U, Mo, Al, Li, Mg)

393-R. Effect of Zinc Ion on Corrosion of 2S Aluminum, Type 347, and SAE 1020 Steel in Static Water at 500° F. C. Wohlberg. *Argonne National Laboratory (U. S. Atomic Energy Commisssion),* ANL-5399, May 1956, 36 p.

A series of tests made to evaluate the influence of zinc ion on the corrosion behavior. (R4, SS, ST, Al)

394-R. Attack on Metals by Bismuth-Lead-Tin Alloy at Elevated Temperatures. W. D. Wilkinson. *Argonne National Laboratory (U. S. Atomic Energy Commission),* ANL-5262, Jan. 1954, 73 p.

The metals tested included aluminum, Armco iron, cast iron, beryllium, titanium, zirconium and various steels. Various test procedures and types of tests employed. (R6)

395-R. An Investigation Into the Air-Heater Corrosion of Oil-Fired Boilers. B. Lees. *Combustion,* v. 28, July 1956, p. 38-42.

Methods which have been successfully applied to reduce the fouling and wastage, future experiments. (R9)

396-R. Plant Instruments in Corrosive Atmospheres. Leo Walter. *Corrosion Technology,* v. 3, July 1956, p. 221-225.

Design, installation and maintenance. (R3, T8)

397-R. Effect of Lubricant on Pitting Failure of Ball Bearings. F. T. Barwell and D. Scott. *Engineering,* v. 182, July 6, 1956, p. 9-12.

Experimental results for various fluids. (R2, ST)

398-R. Soldered Joints in Aluminium: Mechanism of Corrosion. W. J. Smellie. *Light Metals,* v. 19, July 1956, p. 210-214.

Quick electrochemical interface failure is to be expected on joints made from solders consisting of tin,

lead and cadmium. Zinc-base solders are preferred where a wide range of service conditions is anticipated. (R1, K7, Al)

399-R. Location of Contact Between Cathodically Protected Lines and a Foreign Line. L. F. Heverly. *Pipe Line News,* v. 28, July 1956, p. 49-50, 54.

Contact between a cathodically protected pipe line and a bare water line in a distribution network can destroy the usefulness of a cathodic protection system unless steps are taken to electrically isolate one from the other. Procedure used to find the exact location of a contact with a water line underneath a reinforced concrete paved street. (R10)

400-R. The Oxidation of Aluminium in Dry and Humid Oxygen Atmospheres. R. K. Hart. *Royal Society, Proceedings,* v. 236, ser. A, July 10, 1956, p. 68-88.

Film growth in dry oxygen is at first rapid and then slow, the growth rate being inverse logarithmic. The presence of water vapor increases film growth, due to small, though continual, changes in the electrical properties of the films during thickening. (R2, Al)

401-R. Chromium Chemicals in Corrosion Prevention. H. A. H. Pray. Paper from "Chromium", v. I. Chemistry of Chromium and Its Compounds. Monograph Series No. 132. Rheinhold Publishing Corp., p. 343-356.

Effects of chromium compounds in aqueous solution on the corrosion of metals. Ways in which they are used in the production of chemical conversion coatings and other metal-surface treatments. (R5, L14, Cr)

402-R. (German.) **The Scaling of Technical Gold Alloys and Its Avoidance in Heat Treatment.** H. Spengler. *Metall,* v. 10, no. 13-14, July 1956, p. 617-620.

Deals with scaling processes in 12 to 14-carat gold-silver-copper alloys with and without additions of palladium, nickel and zinc. Silver and palladium decrease the rate of scaling in alloys, while nickel and zinc increase it. (R2, Ag, Au, Cu)

403-R. (German.) **Investigation in the Field of Stress-Corrosion of α-Brass in Ammonia Vapor. II. The Kinetics of Crack Formation.** Franz Aebi. *Zeitschrift für Metallkunde,* v. 47, no. 6, June 1956, p. 421-426.

Graphical representation of durability against initial stress in stress-corrosion tests; mathematical relation. (R1, Cu)

404-R. (Russian.) **Corrosion of the Cylinders of Automobile and Tractor Engines.** B .B. Genbom. *Avtomobil'naia i Traktornaia Promyshlennost',* no. 5, May 1956, p. 18-23.

Temperature of combustion of fuels and other conditions controlling electrochemical corrosion of cylinders. Uneven distribution of temperature on cylinder surfaces as a cause of uneven wear. Effect of variation in engine's cooling system. (R7, R9, Q9, ST)

405-R. (Russian.) **On the Oxidation of Tungsten at High Temperatures.** V. I. Arkharov and Iu. D. Kozmanov. *Fizika Metallov i Metallovedenie,* v. 2, no. 2, 1956, p. 361-369.

An experimental study of the phase composition of tungsten scales in the 500 to 1350° C. range and of the mechanism of oxidation at high temperatures. (R2, W)

406-R. The Corrosion Test Spool. R. Law. *Canadian Chemical Processing,* v. 40, July 1956, p. 36-38.

Details and applications of an on-the-job scheme for testing corrosion resistance. (R11)

407-R. The Effects of Contamination by Vanadium and Sodium Compounds on the Air Corrosion of Stainless Steel. G. W. Cunningham and Anton deS. Brasunas. *Corrosion,* v. 12, Aug. 1956, p. 389-405.

The severe corrosion of heat resistant alloys when contaminated by vanadium pentoxide is aggravated by additions of sodium sulfate up to 30%, the most severe mixture being in the region of 15 to 20%. This increased corrosion seems to be related to the oxygen solubility in the molten mixtures. Certain additives are effective in retarding the corrosion. (R3, Na, V, SS)

408-R. The Sulfuric Acid Resistance of Low-Nickel, High-Chromium Steels Containing Molybdenum and Copper. W. Tofaute and H. J. Rocha. *Henry Brutcher, Translation No.* 3731, 12 p. Henry Brutcher, Altadena, Calif. (Abridged from *Technische Mitteilungen Krupp,* v. 12, no. 3, 1954, p. 67-72.)

A simple method of determining passivation ranges; results of corrosion tests. (R6, AY, Cr, Ni)

409-R. Durability of Glued Wood to Metal Joints. Herbert W. Eickner. *U. S. Department of Agriculture, Forest Products Laboratory, Report No.* 1570, Oct. 1954, 33 p.

Comparative durability in various atmospheres and chemicals of joints made with different commercial adhesives. (R3, R5, R6, K12)

410-R. (French.) **Oxidation of Nickel-Chromium Alloys at High Temperatures.** J. Moreau. *Corrosion et Anticorrosion,* v. 4, no. 5, June 1956, p. 211-216.

Tests to determine if, in a binary alloy, both metals are oxidized simultaneously. Nickel-chromium alloys under atmospheric pressure and between 900 and 1300° C. oxidize simultaneously. (R2, Ni, Cr)

411-R. (French.) **Corrosion in Steam and Condensate Lines. Causes and Prevention.** J. Pierrey. *Corrosion et Anticorrosion,* v. 4, no. 5, June 1956, p. 225-230.

Corrosion caused by oxygen, and especially carbonic acid plus moisture. Various methods for removing carbonates and bicarbonates from the water. Use of volatile amines and of film-forming amines as neutralizers. (R4, R10)

412-R. (French.) **Tubing of a No. 80 Special Steel Applied in France to Resist Fissuring Corrosion of Gas Rich in H_2S From Lacq Field.** L. Cauchois, J. Didier and E. Herzog. *Revue de l'Institut Français du Pétrole et Annales des Combustibles Liquides,* v. 11, no 5, May 1956, p. 573-583.

Steel is suitable for high-pressure sour-gas field tubing. (R9, T28, ST)

413-R. (German.) **On the Action of Acid Solvents on Certain Hard Silicides and High-Melting Metals.** M. K. Disen and G. F. Huttig. *Planseeberichte für Pulvermetallurgie,* v. 4, no. 1, Apr. 1956, p. 10-14.

Tabulated data on the solubility of $MoSi_2$, WSi_2, VSi_2, $NbSi_2$, $TaSi_2$ and $ZrSi_2$, as well as metallic titanium, zirconium, chromium, molybdenum and tungsten in various acid solvents.
(R6, Ti, Zr, Cr, Mo, W)

414-R. (German.) **The Role of the Dispersed Soil Phase in Underground Iron Corrosion.** T. Markovic, B. Jazbec and N. Plavsic. *Werkstoffe und Korrosion,* v. 7, no. 7, July 1956, p. 385-390.

Effect of dispersed soil particles in the water layer on the corrosion of iron. Oxygen distribution in the liquid column of dispersed alumina particles. (R8, Fe)

415-R. (Serbian.) **Materials for Storage of Sulfuric Acid.** E. Rabald. *Zastita Materijala,* v. 4, no. 6, June 1956, p. 193-197.

The corrosive effect of sulfuric acid on various types of steels and alloys under different conditions. (R6, AY)

416-R. (Book.) **Symposium on Atmospheric Corrosion of Non-Ferrous Metals.** ASTM Special Technical Publication No. 175. 158 p. 1956. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa.

Reports on the 20-year tests sponsored by ASTM. A report on 10 year exposure tests was issued in 1946. (R3, EG-a)

417-R. Metal Transport in Liquid-Water Systems and Effect on Heat Transfer. S. C. Datsko. *ASME Transactions,* v. 78, Aug. 1956, p. 1223-1227.

Effects on heat transfer caused by the corrosion of zirconium tubes and by the deposition of corrosion products of a stainless steel system on the zirconium-tube walls.
(R4, SS, Zr)

418-R. The Reaction of Hydrogen With Uranium Alloy Types. William M. Albrecht and Manley W. Mallett. *Battelle Memorial Institute, Metallurgy and Ceramics, Report* no. 1108, July 1956, 16, p.

Reactions with various alloys were investigated in the range 100 to 425° C. to determine effect of structure upon reaction rates.
(R9, P13, U)

419-R. Earth Potential or Surface Potential Gradient Tests on Buried Cables. Daniel R. Werner. *Corrosion,* v. 12, Aug. 1956, p. 376-384.

Topics include range of potentials, selection of areas for tests, installation of remedial measures on buried telephone cables, determination of buried structure location and meter circuits for measuring potential gradients. (R10)

420-R. A Laboratory Method for the Evaluation of Oil Production Corrosion Inhibitors. David B. Boies. *Corrosion,* v. 12, Aug. 1956, p. 371-375.

Effects on inhibitor performance of such variables as temperature, oil-brine ratio, aromatic content of oil blend and composition of gas phase shown graphically. (R10)

421-R. The Role of Crevices in Decreasing the Passivity of Titanium in Certain Solutions. David Schlain and Charles B. Kenahan. *Corrosion,* v. 12, Aug. 1956, p. 422-426.

A possible explanation is that corrosion in the air-starved crevices (anodic surfaces) results in the flow of electrons to and the evolution of active hydrogen on the remainder of the titanium specimen (cathodic surfaces), thus destroying the protective oxide film. (R10, Ti)

422-R. The Stress-Corrosion of Certain Aluminium Alloys. H. K. Farmery and U. R. Evans. *Institute of Metals, Journal,* v. 84, July 1956, p. 413-422 + 2 plates.

Effect of surface condition on stress-corrosion cracking, effects of pre-immersion, electrolyte and junction with other metals. Variation of life with applied stress and with exposed area. (R1, Al)

423-R. Stress-Corrosion Cracking of Brass. *National Bureau of Standards, Technical News Bulletin,* v. 40, Aug. 1956, p. 109-110.

Crystal orientation has an important influence on the galvanic action which causes stress-corrosion cracks. (R1, Cu)

424-R. Static Corrosion Behavior of Materials in Bismuth and Uranium-Bismuth Solution at 550° C. J. E. Atherton, O. F. Kammerer, C. J. Klamut and J. Sadofsky. *Brookhaven National Laboratory (U. S. Atomic Energy Commission),* BNL-395 (T-76), Aug. 1954, 8 p.

Intermediate chromium steels corrode in such solutions. The addition of small amounts of magnesium and zirconium to the bismuth makes this corrosion negligible. (R6, R10, U, Bi)

425-R. The Intergranular Corrosion of Aluminum in Superheated Steam. C. Groot and R. E. Wilson. *Hanford Atomic Products Operation (U. S. Atomic Energy Commission),* HW-41797, May 1956, 18 p.

Intergranular attack is quite localized in the earlier stages. Effects of temperature, pressure and composition are shown. Lack of iron results in poor resistance to intergranular attack. (R2, R4, Al)

426-R. Mathematical Analysis of Galvanic Corrosion. VI. Electrode Systems With Cylindrical Geometry. VII. Some Potential Functions for Spherical Electrode Systems. John M. Ruth and James T. Waber. *Los Alamos Scientific Laboratory (U. S. Atomic Energy Commission),* LA-1993 and LA-1994, Sept. 1956, 31 and 17 p.

Formal expressions for the interfacial potentials and the dimensionless corrosion current parameter were derived. Various forms of the radial dependence are tabulated. (R1)

427-R. Fundamentals of Liquid-Metal Corrosion. W. D. Manly. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission),* ORNL 2055, July 1956, 10 p.

Types of corrosion, variables affecting corrosion, role of impurities. (R6)

428-R. (German.) **Methods of Testing Corrosion.** H. Spindler. *Feingerätetechnik,* v. 5, no. 7, July 1956, p. 290-296.

Theoretical fundamentals. Various natural and laboratory testing methods, their advantages and disadvantages. (R11)

429-R. (Russian.) **Mechanism of Electrochemical Corrosion of Metals in Soil.** N. D. Tomashov and In. N. Mikhailovskii. *Doklady Akademii Nauk SSSR,* v. 108, no. 4, June 1, 1956, p. 668-671 + 1 plate.

Effects of formation of corrosion couples on corrosive action. (R1, R8)

430-R. (Russian.) **Corrosion of Chemical Apparatus by Aqueous Solution of Mono-Ethanolamine.** M. L. Rutkovskii. *Khimicheskaia Promyshlennost',* no. 3, Apr.-May 1956, p. 25-28.

Corrosion of carbon steel is initiated by corrosive compounds in the mono-ethanol amine. By distilling under vacuum the compounds can be eliminated. (R7, CN)

431-R. Effects of pH and Velocity on Corrosion of Steel Water Pipes. Rolf Eliassen, Clemente Pereda, Amilcar J. Romeo and Rolf T. Skrinde. *American Water Works Association, Journal,* v. 48, Aug. 1956, p. 1005-1018.

Past investigations, objectives of study, experimental apparatus, observed effect of pH, mechanism of pH effects, theoretical velocity effects. (R4, ST)

432-R. The Effect of Sulphur Dioxide on the Oxidation of Copper. T. Mills and U. R. Evans. *Chemical Society, Journal,* July 1956, p. 2182-2196.

Sulphur dioxide accelerated the oxidation of copper, although it did not alter the mechanism of the film-growth laws. (R2, R9, Cu)

433-R. The Oxygen Concentration Cell as a Factor in the Localized Corrosion of Metals, Wilson Lynes. *Electrochemical Society, Journal,* v. 103, Aug. 1956, p. 467-474.

The current produced by an oxygen concentration cell is considered in terms of the open-circuit potentials and polarizing characteristics of the anode and cathode and the resistance of metal and electrolyte. (R1, Al, Cu, Fe, Ti)

434-R. The Mechanism of the Inhibition of Corrosion by the Pertechnetate Ion. IV. Comparison With Other XO_4^{n-} Inhibitors. R. F. Sympson and G. H. Cartledge. *Journal of Physical Chemistry,* v. 60, Aug. 1956, p. 1037-1043.

Covers measurements with the pertechnetate, chromate, molybdate and tungstate ions as inhibitors and the chloride, thiocyanate, sulfate and perrhenate ions as noninhibiting competing ions. (R10)

435-R. Mathematical Analysis of Galvanic Corrosion. VIII. Alternating System of Electrodes With Interposed Insulators. James T. Waber and John M. Ruth. *Los Alamos Scientific Laboratory (U. S. Atomic Energy Commission),* LA-2028, Apr. 1956, 14 p.

The formal expression for the potential throughout the corrodent is derived. Distribution of current density over the anode is expressed in terms of a simple trigonometric formula. (R1)

436-R. (Czech.) **Industrial Applications of Vapor Phase Corrosion Inhibitors.** J. Ruzicka. *Strojirenska Vyroba,* v. 4, no. 6, June 1956, p. 256-259.

Protecting metal articles from corrosion between processing operations and when finished. Treated paper wrapping. Properties, types and advantages of vapor phase inhibitors. Use in lubricants and hydraulic control systems. (R10)

437-R. (French.) **Corrosion in the Chemical Industry.** Pierre Bachmann. *Chimia (Switzerland),* v. 10, no. 8, Aug. 1956, p. 189-194.

Different corrosion mechanisms, chemical and electrochemical corrosion, measurement of corrosion. (R1, R11)

438-R. (French.) **Corrosion Prevention.** D. Pétrocokino and J. Frasch. *Corrosion et Anticorrosion,* v. 14, no. 7, July-Aug. 1956, p. 246 to 251.

Problems of corrosion prevention by cathodic protection inhibitors, and coatings. (R10, L26)

439-R. (French.) **The Process of Oxidizing Metals and Alloys at High Temperatures.** J. Bénard. *Métaux, Corrosion-Industries,* v. 31, nos. 371-372, July-Aug. 1956, p. 306-310.

Factors influencing oxidizability of metals and alloys as influenced by the oxide layer between metal and oxygen, nature of component metals, impurities and surface temperature. (R2)

440-R. (French.) **Influence of Iron and Silicon Contents on the Corrosion Resistance of A-U2GNZr.** Roger Chevalier and Roger Lerner. *Revue de l'Aluminium,* v. 33, no. 233, June 1956, p. 609-613.

Results show that the most notable effect of corrosion on turbo-jet compressor blades is a reduction of the elongation; anodization offers a very effective protection but tension fosters corrosion. (R general, L19, Al)

441-R. (German.) **Electrochemical Investigations of the Effect of Mill Scaling of Steel on Corrosion and on the Etching Process.** Franz Wever and Hans-Jürgen Engell. *Archiv für das Eisenhüttenwesen,* v. 27, no. 7, July 1956, p. 475-486.

Effect of local elements, mechanism of etching, effect of dissolved oxygen and pH value. (R2, R11, ST)

442-R. (German.) **Study of Corrosion. IV. Electrochemical and Corrosion-Kinetic Study of Zinc in Water.** K. Smrcek and K. Barton. *Collection of Czechoslovak Chemical Communications,* v. 21, no. 2, Apr. 1956, p. 339-348.

Corrosion behavior in city, industrial, distilled and sea waters at 20 to 95° C. (R1, R4, Zn)

443-R. (Italian.) **Atmospheric Corrosion Stations of the I.S.M.L.** G. Luft. *Alluminio,* v. 25, no. 7-8, July-Aug. 1956, p. 321-332.

Installation at Arenzano and Novara, results on the behavior of rolled light alloys exposed to industrial, urban and marine atmospheres. (R3, Al)

444-R. (Italian.) **Researches on the Oxidation of Metals and Alloys in the Fused State. I. Lead. II. Cadmium. III. Tin. IV. The System Tin-Lead. V. The System Lead-Cadmium.** Paolo Spinedi. *Gazzetta Chimica Italiana,* v. 86, nos. 5, 6, and 7, May, June, and July, 1956, p. 561-608.

A study of the behavior in the solid or liquid state using a continuous recording thermogravimetric method. Graphic representation of the oxidation speed. Comparison with other work. (R2, C general, Pb, Cd, Sn)

445-R. (Italian.) **On High-Temperature Corrosion of Metals by Vanadium Dioxide. I. Research on System Metal-Vanadium-Oxygen.** V. Cirilli, A. Burdese and C. Brisi. *Metallurgia Italiana,* v. 48, no. 7 July 1956, p. 309-316.

Equilibrium diagrams between vanadium dioxide and iron, chromium, nickel and cobalt peroxides. (R9, R6, Fe, Cr, Ni, Co)

446-R. (Russian.) **Investigation With Radioactive Indicators of the Reaction Mechanism of Thiophosphoro-Organic Additives to Oils.** G. V. Vinogradov, M. M. Kusakov, P. I. Sanin, Iu. S. Zaslavskii, E. A. Razumovskaia, A. V. Ul'ianova and D. V. Riabova. *Khimiia i Tekhnologiia Topliva,* no. 6, June 1956, p. 14-20.

Antiwear properties of additives. Effects of presence of phosphorus and sulfur. (R10, Q9, ST, Cu)

447-R. Applications of Plastics in Marine Cathodic Protection Systems. Herman S. Preiser and Maxwell

Stander. *American Society for Naval Engineers, Journal,* v. 68, Aug. 1956, p. 581-590.

Plastics have proved to be versatile materials with almost an unlimited range of properties and are admirably suited for use in fabrication of cathodic protection equipment. (R10)

448-R. Two Cases of Corrosion in Suburban New York Disguised as Galvanic—Their Cause and Mitigation. W. Searle Woodward. *Corrosion,* v. 12, Sept. 1956, p. 427-432.

Reports instances in which stray current potentials were mistaken for galvanic potentials from underground lead-sheathed telephone cables to ground. Development of suitable meters enabled determination of true potentials of the cables. (R8, Pb)

449-R. Steel Surface Properties Affect Internal Corrosion Performance of Tin Plate Containers. A. R. Willey, J. L. Krickl and R. R. Hartwell. *Corrosion,* v. 12, Sept. 1956, p. 433-440.

Two easily performed laboratory tests were developed—One, the "rate of pickling" test, the other, the "iron solution" test. (R5, R11, ST, Sn)

450-R. Aqueous Corrosion of Aluminum. I. Behavior of 1100 Alloy. J. E. Draley and W. E. Ruther. *Corrosion,* v. 12, Sept. 1956, p. 441-448.

Aluminum alloy 1100 corrodes uniformly in nearly pure water at rates which increase with temperature. Corrosion rate reduced by addition of an acid. Corrosion in slightly alkaline solutions (pH 8.5) is more rapid than in neutral water at all temperatures. (R4, Al)

451-R. Behavior of 18-8 Stainless Steel in 2-Normal Boiling Nitric and Sulfuric Acid-Mixtures. P. E. Krystow and M. Balicki. *Corrosion,* v. 12, Sept. 1956, p. 449-454.

When exposed to a range of boiling 2*N* sulphuric-nitric acid solutions the steels pass through a passive zone of negligible corrosion, a transition zone of irregular corrosion and two active zones of substantial corrosion. (R5, SS)

452-R. Attack of Scaling-Resistant Materials by Vanadium Pentoxide and Effect of Various Alloying Elements Thereon. E. Fitzer and J. Schwab. *Corrosion,* v. 12, Sept. 1956, p. 459-464.

Possibilities of developing metallic materials able to stand up under the attack by the combustion gases in crude-oil fired gas turbines. (R9, Ni, ST)

453-R. The Relation of Thin Films to Corrosion. Thor N. Rhodin. *Corrosion,* v. 12, Sept. 1956, p. 465-475.

Evaluation of the resistance to pitting corrosion of silicon-modified Type 316L stainless steel. Improved corrosion behavior was correlated with a mutual film-enrichment of silicon and molybdenum and a film-depletion of iron. (R2, SS)

454-R. Cathodic Protection Installation on M. S. "Regent Springbok". *Corrosion Technology,* v. 3, Aug. 1956, p. 251-253, 265.

A well-established and proven method of preventing deterioration due to corrosion of bulkheads, stringers and other members. Design and procedure adopted, together with information on tanker cargo compartment corrosion theory. (R10, ST)

455-R. An Approach to the Corrosion Problem. Anton deS. Brasunas. *Corrosion Technology,* v. 3, Aug. 1956, p. 261-265.

Nature of corrosion attack, corrosion principles and rates, mitigation. (R1)

456-R. The Fretting Corrosion of Mild Steel. J. S. Halliday and W. Hirst. *Royal Society, Proceedings,* v. 236, ser. A, Aug. 2, 1956, p. 411-425 + 3 plates.

Measurements of the frictional forces, the degree of damage and the variations in the electrical contact resistance for a wide range of applied loads, vibration amplitudes and number of cycles of motion. (R1, CN)

457-R. A Study of the Air Contamination of Three Titanium Alloys. J. E. Reynolds, H. R. Ogden and R. I. Jaffee. *American Society for Metals, Transactions,* v. 49, *Preprint No.* 11, 1956, 26 p.

Contamination was studied by utilizing the Van Ostrand-Dewey diffusion analysis of microhardness-penetration data. Equations were derived expressing the depth of contamination in terms of a time-temperature parameter. (R2, Ni, Ti)

458-R. Some High-Temperature Oxidation Characteristics of Nickel With Chromium Additions. G. E. Zima. *American Society for Metals, Transactions,* v. 49, *Preprint No.* 37, 1956, 26 p.

The relationship between alloy chromium content and oxidation rate was determined for nickel-chromium alloys containing up to 17 At % chromium. The high oxidation stability was correlated with the presence of Cr_2O_3 in the oxide layer. (R2, Ni, SG-h)

459-R. (Dutch.) **Corrosion Protection by Means of Inhibitors.** M. Oudeman.

Metalen, v. 11, no. 14, July 31, 1956, p. 304-309.

The mechanism of corrosion and the effects produced by anodic, cathodic or absorption inhibitors. A survey of various new practical applications. (R10)

460-R. (French.) **Behavior of the Reactive Anodes in Magnesium and in Zinc.** J. Van Muylder and M. Pourbaix. *Centre Belge d'Etude de la Corrosion, Rapport Technique,* no. 34, May 1956, 59 p. + 22 graphs.

Theoretical consideration of cathodic protection by reactive anodes, using pH tension diagrams. Relationship between polarization curves and anodic production of current. Influence of metals, medium and density of current on anodes. Practical applications. (R10, Mg, Zn)

461-R. (French.) **Corrosion Prevention in Packing and During Storage.** F. Vandervelden and M. Pourbaix. *Centre Belge d'Etude de la Corrosion, Rapport Technique,* no. 37, May 1956, p. 3-8.

Various cleaning and drying methods for metallic parts before packing or storing. Coating processes and packing materials. (R10, L26)

462-R. (Book—German.) **Corrosion of Metals in Aggressive Media.** W. P. Batrakow. (Translated from the Russian by Heinz Frahn.) 511 p. 1954. Verlag Technik, Berlin, East Germany.

Physical-chemical properties of the most common gases and acids. Corrosion of metals and alloys by gases, nitric acid, and sulfuric acid. Corrosion fatique of metals and alloys. Other corrosion producing media. (R general)

463-R. Oxidation of Copper to Cu_2O and CuO. Donald W. Bridges, John P. Baur, Gretta S. Baur and W. Margin Fassell, Jr. *Electrochemical Society, Journal,* v. 103, Sept. 1956, p. 475-478.

An investigation of the system, $Cu\text{-}Cu_2O\text{-}CuO\text{-}O_2$, at temperatures from 600 to 1000° C., in pure oxygen from 0.026 to 20.4 atmospheres. (R2, Cu)

464-R. Effect of Prior Corrosion History on the Corrosion of Zircaloy-2 in High Temperature Water. D. E. Thomas and S. Kass. *Electrochemical Society, Journal,* v. 103, Sept. 1956, p. 478-482.

Method permits in a relatively short time the prediction of the corrosion behavior of Zircaloy-2 after very long exposure times in high-temperature water. (R4, R11, Zr)

465-R. Natural and Thermally Formed Oxide Films on Aluminum. M. S. Hunter and P. Fowle. *Electrochemical Society, Journal,* v. 103, Sept. 1956, p. 482-485.

Films consist of a layer of barrier-type oxide, the thickness of which is primarily a function of temperature, and a porous layer, the thickness of which is determined by time and natural forces associated with the environment. (R1, R3, Al)

466-R. The Tin-Steel Couple in Air-Free Citric Acid Solution. E. L. Koehler. *Electrochemical Society, Journal,* v. 103, Sept. 1956, p. 486-491.

All observed effects on the corrosion rates in this medium, whether traceable to the steel, dissolved tin inhibitor, or coupling to tin, appear to be the results of variations in anodic properties. (R5, Sn, ST)

467-R. Corrosion of Nickel-Chromium-Iron Alloys by Welding Slags. G. R. Pease. *Welding Journal,* v. 35, Sept. 1956, p. 469S-472S.

Incompletely removed welding slag residues can initiate rapid corrosive attack on alloys used in high-temperature service. (R6, K1, Ni, Cr, Fe)

468-R. Methods of Testing for Corrosion Fatigue. A. V. Ryabchenko and E. I. Kazimirovskaya. *Henry Brutcher Translation No.* 3796, 8 p. (From *Zavodskaya Laboratoriya,* v. 21, no. 3, 1955, p. 345-349.) Henry Brutcher, Altadena, Calif.

Test data on plain carbon and heat resisting steels in air, humid air and air containing sulphur dioxide, at ordinary temperatures and up to 700° C. (R1, R3, R11, CN, AY)

469-R. (English.) **Initial Oxidation Rate of Metals and the Logarithmic Equation.** Herbert H. Uhlig. *Acta Metallurgica,* v. 4, no. 5, Sept. 1956, p. 541-554.

Oxidation follows the logarithmic equation during formation of space-charge layers, with a higher oxidation rate accompanying formation of the diffuse layer. Beyond the space-charge layer, either the linear or the parabolic equation is obeyed. (R2, Cu)

470-R. (German.) **Pre-Heater and Condenser Corrosion.** *VDI Zeitschrift,* v. 98, no. 24, Aug. 1956, p. 1472-1473.

Corrosion of copper and copper-alloy condensers. Suggestions for alloy composition and other corrosion preventive measures. (R4, R10, Cu)

471-R. (German.) **Oxidation of Titanium.** Willy Kinna and Willy Knorr. *Zeitschrift für Metallkunde,* v. 47, no. 8, Aug. 1956, p. 594-598.

Oxide layers on titanium annealed at 800, 1000 and 1200° C. in air and in pure oxygen are studied. (R2, Ti)

472-R. (German.) **Corrosion of Titanium and Titanium Alloys.** Otto Rüdiger, Willy Knorr and Wolfgang R. Fischer. *Zeitschrift für Metallkunde,* v. 47, no. 8, Aug. 1956, p. 599-604.

Surveys the behavior of unalloyed titanium towards chemical corrosion. Surface layers studied by electron-diffraction photographs. (R5, R11, Ti)

473-R. (Italian.) **On High Temperature Corrosion of Metals by Vanadium Dioxide. II. Behavior of Iron, Cobalt, Nickel, Chromium and Their Alloys.** A. Burdese and C. Brisi. *Metallurgia Italiana,* v. 48, no. 8, Aug. 1956, p. 349-357.

Systematic research carried out to identify the compounds present in corrosion products as obtained from etching of metallic materials by vanadium dioxide. (R9, Fe, Co, Ni, Cr)

474-R. (Russian.) **Linearly Selective Corrosion of Nitrided Steel by Sulfuric-Acid-Containing Admixtures.** S. A. Balezin and V. B. Ratinov. *Doklady Akademii Nauk SSSR,* v. 108, no. 5, June 11, 1956, p. 903-904.

Distinguishes between additives to sulphuric acid which affect primarily the cathodic regeneration of hydrogen ions and those of primarily anodic action, and finds that best corrosion inhibiting results are achieved by simultaneous use of additives of both types. (R5, R10, CN)

475-R. (Russian.) **A Study of the Process of High-Temperature Oxidation of Metallic Titanium in Water Vapor.** G. P. Luchkin and G. G. Il'in. *Fizika Metallov i Metallovedenie,* v. 2, no. 3, 1956, p. 521-523.

Higher oxidability is explained by the structural peculiarities of scale formation, which accounts for a more intensive diffusion of oxygen in the metal than in the case of oxidation in open air. (R2, R4, Ti)

476-R. (Russian.) **A Study of Internal Oxidation of Alloys of Silver With Cadmium and Copper.** V. V. Usov and E. M. Murav'eva. *Fizika Metallov i Metallovedenie,* v. 2, no. 3, 1956, p. 552-561 + 1 plate.

An experimental study of the time and temperature dependence of the process of internal oxidation in alloys annealed in oxygen, and of the effect of oxygen pressure on that process. (R2, Ag, Cd, Cu)

477-R. (Russian.) **Kinetics of Oxidation of Iron Silicide in an Atmosphere of Air, at High Temperature.** V. V. Ipat'ev and G. M. Orlova. *Zhurnal Prikladnoi Khimii,* v. 29, no. 6, June 1956, p. 811-818.

Oxidation of iron silicide at 700, 800, 920 and 1000° C. Temperature relation of oxidation rate. Correlation between the oxidation-rate constant and the structure of the scale. (R2, Fe, Si)

478-R. (Russian.) **Oxidation of Chromium-Silicon Steels at High Temperatures.** G. M. Orlova and V. V. Ipat'ev. *Zhurnal Prikladnoi Khimii,* v. 29, no. 6, June 1956, p. 819-828.

Effect of silicon on the kinetics of scale formation in the case of 6% chromium steel. Structure and composition of the scale. (R2, AY)

479-R. (Russian.) **Measures Against Corrosion Cracking of Brass Receptacles for Liquid Fuel.** A. V. Shreider. *Zhurnal Prikladnoi Khimii,* v. 29, no. 7, July 1956, p. 1044-1056.

Percentages of sulphur in the fuel and ammonia in the air, below which corrosion cracking does not take place. Mechanism of protection by cadmium coating. Tendency of copper alloys to corrosion cracking. (R1, R7, L17, Cd, Cu)

480-R. (Russian.) **Processes of Formation and Destruction of Films in the Cathodic Protection of Steel Surfaces in Sea Water.** I. B. Ulanovskii. *Zhurnal Prikladnoi Khimii,* v. 29, no. 7, July 1956, p. 1056-1062.

Composition of cathodic films in relation to the ionic composition of sea water. Formation and role of secondary films. Rate of corrosion of steel parts in relation to current density. Adaptation of current regime to local conditions. (R10, ST)

481-R. Corrosion and Components Studies on Systems Containing Fused NaOH. Eugene M. Simons, Neil E. Miller, John H. Stang and C. Vernon Weaver. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* BMI-1118, July 1956, 44 p.

Experimental data on containers for molten sodium hydroxide; miscellaneous corrosion tests with numerous inorganic additives, graphites, irons, prenitrided base metals, and oxidized zirconium; components for flow systems. (R6, Fe, Zr, Ni)

482-R. Selecting Copper and Its Alloys III. Corrosion Resistance. *Copper & Brass Bulletin,* 1956, no. 178, Sept. 1956, p. 8-9.

Standard commercial wrought copper and copper-base alloys are rated according to their corrosion resistance under various conditions. (R general, S22, Cu)

483-R. Corrosion of Aluminium in Proximity With Iron. C. E. Bird and U. R. Evans. *Corrosion Technology,* v. 3, Sept. 1956, p. 279-281.

Whether or not there is electrical contact, the proximity of iron or steel to aluminum or its alloys may cause intensification of attack, even though the total destruction is actually reduced. (R4, ST, Al, Fe)

484-R. (French.) **High-Temperature Tests on Commercially Pure Titanium.** G. Sertour and M. El Gammal. *Revue de Métallurgie,* v. 53, no. 8, Aug. 1956, p. 619-626.

Normal atmosphere oxidation tests show that titanium oxidation is important only above 600° C. (R2, R3, Ti)

485-R. (French.) **Influence of Structure and Thickness of Electrolytic Chromium Plating on Corrosion.** P. Morisset. Paper from "Chrome Dur". p. 35-40.

A study of decorative as well as hard chromium plating, and of the parameters present in corrosion control. (R3, L17, Cr)

486-R. (German.) **Contribution to the Problem of Rusting of Commercial Iron.** Anton Königer. *Giesserei,* v. 43, no. 18, Aug. 30, 1956, p. 498-505.

Reactions in the homogeneous and heterogeneous system; the pH-range of corrosion; iron, hydrogen and oxygen potentials. (R general, Fe)

487-R. (German.) **Corrosion Testing.** Bruno Waeser. *Erdöl und Kohle,* v. 9, no. 8, Aug. 1956, p. 530-534.

Various devices for testing and measuring corrosion. (R11)

488-R. (German.) **Casting Alloys in the Construction of Chemical Apparatus.** Erich Rabald. *Werkstoffe und Korrosion,* v. 7, no. 8-9, Sept. 1956, p. 435-448.

Chemical resistivity and applications of several alloy irons and steels. (R general, T29, AY)

489-R. (German.) **The Influence of Lithium Oxide Vapor Treatments on the Rate of Oxidation of Iron.** Erwin Brauns and Alfred Rahmel. *Werkstoffe und Korrosion,* v. 7, no. 8-9, Sept. 1956, p. 448-452.

A temporary decrease in the rate of oxidation was achieved at 850° C. (R2, Li, Fe)

490-R. (Russian.) **Effect of Cathode and Anode Polarization on Corrosion Sensitivity of MA-3 Alloy to Cracking in a Solution of 35 g. Per 1 NaCl+20 g. Per 1 K_2CrO_4.** V. V. Romanov. *Zhurnal Prikladnoi Khimii,* v. 29, no. 8, Aug. 1956, p. 1191-1196.

Continuous increase in corrosion cracking sensitivity by anodic polarization of 0 to 5 milliamp. per sq.cm. Cathodic polarization decreases corrosion cracking sharply at 1.5 to 2 μ-amp. per sq.cm. (R1, R10, Mg, Al)

491-R. (Russian.) **Effect of Steam on Metal Corrosion by Chlorine.** Kh. L. Tseitlin. *Zhurnal Prikladnoi Khimii,* v. 29, no. 8, Aug. 1956, p. 1182-1191.

Effect of air and steam on chlorine corrosion of metals with protective oxide coating. Studies of iron, aluminum, tantalum, stainless steels and alloys or metals subject to direct chlorination such as copper, lead and nickel. Effect of temperature. (R4, R9, Fe, Al, Ta, SS, Cu, Pb, Ni)

492-R. Fundamentals of Cathodic Protection. I. John H. Morgan. *Corrosion Prevention and Control,* v. 3, Sept. 1956, p. 45-48.

Comprehensive explanation of its mechanism and uses. Elementary circuits, paints, polarization, protection in an electrolyte. (To be continued.) (R10, Fe)

493-R. Electrochemical Aspects of Underground Corrosion and Cathodic Protection. W. E. Edwards. *Electrical Engineering,* v. 75, Oct. 1956, p. 907-912.

Basic principles of corrosion of underground metallic structures. Methods of preventing corrosion. (R10, R8, ST)

494-R. Atmospheric Corrosion of Metals. I. B. Sanyal and G. K. Singhania. *Journal of Scientific & Industrial Research,* v. 15, sec. B, Aug. 1956, p. 448-455.

A correlation was observed between rates of corrosion and degree of atmospheric pollution, and meteorological factors for mild steel and zinc. (R3, CN, Zn)

495-R. The Effect of Nickel Content and Furnace Atmosphere on the Scale Formed on Nickel Steels. K. Sachs. *Metallurgia,* v. 54, no. 323, Sept. 1956, p. 109-114.

Inner layer of scale on nickel steels contains nickel-rich metallic particles entangled with the wüstite. Amount of metal in scale diminishes with increasing partial pressure of oxygen in the oxide and with falling nickel content. (R2, AY, Ni)

496-R. Increased Life From Nickel and Tin-Covered Fourdrinier Wires. E. H. Shriver, G. B. King and A. G. Hose. *Tappi,* v. 39, Sept. 1956, p. 618-625.

Dissolved solids controlled corrosion rate in the range of variables studied. Experiments in white paper

mills showed that nickel-plated wires were inferior to bronze-type wires below pH 6.3, and superior above. (R7, R5, Ni, Sn)

497-R. (Book.) **Symposium on High-Purity Water Corrosion.** ASTM Special Technical Publication No. 179. 56 p. June 1955. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa.

Preparation and maintenance of high-purity water; use in atomic reactors; influence of water composition and material composition on high-temperature corrosion; corrosion of carbon and low alloy steels. (R4, CN, AY)

498-R. Effect of Hydrogen Pickup on Corrosion Behavior of Zirconium in Water. Charles M. Schwartz and Dale A. Vaughan. *Battlle Memorial Institute (U. S. Atomic Energy Commission),* BMI-1120, Aug. 1956, 17 p.

Metallographic study of cross sections after exposure of zirconium to 750° F. steam revealed the growth of hydride needles. Incipient formation of layer between the metal and the oxide was observed in crystal-bar zirconium. (R4, Zr)

499-R. Effect of Sulfide Scales on Catalytic Reforming and Cracking Units. I. Metallographic Examination of Samples From a Catalytic Reforming Unit. II. Intergranular Corrosion of 18-8 Cr-Ni Steel as a Result of Hydrolysis of Iron Sulfide Scale. *Corrosion,* v. 12, Oct. 1956, p. 73-76.

Determined that high-temperature hydrogen sulphide-hydrogen corrosion is an intergranular progression. Alloy corrosion was due to action of moist sulphide scale during downtime. (R6, R2, AY, SS)

500-R. Nature of Stress Corrosion Cracking of Stainless Steels When Other Types of Corrosion Are Present. W. G. Renshaw. *Corrosion,* v. 12, Otc. 1956, p. 447-478.

Three cases examined point to some factor of a localized nature which precedes actual transgranular cracking, and probably acts to initiate it. (R1, SS)

501-R. Aqueous Corrosion of Aluminum. II. Methods of Protection Above 200° C. J. E. Draley and W. E. Ruther. *Corrosion,* v. 12, Oct. 1956, p. 480-490.

An alloy containing approximately 1% nickel was developed which is safe against attack up to 350° C. (R4, Ni, Al)

502-R. Application of the Statistical Theory of Extreme Values to the Analysis of Maximum Pit Depth Data for Aluminum. P. M. Aziz. *Corrosion,* v. 12, Oct. 1956, p. 495-506.

Maximum depths obtained on each of replicate samples analyzed by the theory of extreme values. (R2, Al)

503-R. The Structure of Oxide Scales on Chromium Steels. H. J. Yearian, E. C. Randell and T. A. Longo. *Corrosion,* v. 12, Oct. 1956, p. 515-525.

Structural analyses of alloys containing 5 to 26% chromium when oxidized in air or oxygen at temperatures from 700 to 1160° C. up to 100 hr. determined by X-ray diffraction methods. (R2, AY)

504-R. Association of Co^{60} Ions With Metal Surfaces. R. T. Foley, B. T. Stark and C. J. Guare. *Electrochemical Society, Journal,* v. 103, Oct. 1956, p. 534-538.

Technique readily demarks areas that are cathodic to adjacent areas. Steel-copper and aluminum-copper couples were observed, and the strong attraction of radiocobalt to the cathode member of the couple was measured. (R1, Fe, Cu, Al, Co)

505-R. A Mechanism for the Anodic Dissolution of Magnesium. J. H. Greenblatt. *Electrochemical Society, Journal,* v. 103, Oct. 1956, p. 539-543.

Magnesium in the anolyte and in the corrosion product, total hydrogen evolved, and weight loss were determined. (R2, Mg)

506-R. Mathematical Studies of Galvanic Corrosion. VI. Limiting Case of Very Thin Films. J. T. Waber. *Electrochemical Society, Journal,* v. 103, Oct. 1956, p. 567-570.

Limiting case of very thin electrolyte layer which covers coplanar electrode arrangement was analyzed by making electrode dimensions infinitely larger than corrodent depth. (R1)

507-R. Oxidation of Alloys Involving Noble Metals. Carl Wagner. *Electrochemical Society, Journal,* v. 103, Oct. 1956, p. 571-580.

Diffusion processes during the oxidation of alloys are analyzed. Oxidation rate of scale consisting of protruding sections of the oxide of the less noble metal interspersed with slender trunks of alloy rich in the more noble metal was calculated. (R2, EG-c)

508-R. Field Corrosion Tests in Purex Acid Uranium and Waste Concentrators. N. D. Groves and K. M. Haws. *Hanford Atomic Products Operation (U. S. Atomic Energy Commission),* HW-42884, June 1956, 10 p.

Corrosion data on 304-L and 347 stainless steels, 308-L and 347 welding alloys currently in use for heat exchanger construction. (R6, SS, U)

509-R. The Inhibitor I.F.P. 550. *Industrial Finishing,* v. 9, Sept. 1956, p. 109-110; 112-113.

Inquiry into the inhibition of acid attack on metals resulted in the production of a new inhibitor. (R10)

510-R. Experimental Procedures Used for the Measurement of Corrosion and Metal Transport in Fused Sodium Hydroxide. G. P. Smith, M. E. Steidlitz and E. E. Hoffman. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission),* ORNL-2125, Oct. 1956, 6 p.

Techniques for studying corrosion reactions and mass transfer at temperatures up to 815° C. Apparatus is designed for small-scale testing. (R11)

511-R. Corrosion; A Bibliography of Unclassified Report Literature. *U. S. Atomic Energy Commission, TID-*3302, July 1956, 36 p.

Contains 111 annotated references to unclassified reports on the corrosion of alloys, commercial alloys, ceramics and plastics. (R general)

512-R. Interdependence of Various Inhibition Mechanisms in Metals. Jean Frasch. Paper from "XXVIII Congreso Internacional de Quimica Industrial". v. I. Saez, p. 348-354.

Interpretation of the inhibition of corroding media; colloidochemical theory. (R10)

513-R. (French.) **A Corrosion Problem in Evaporators. Action of Caustic Alkalies on Nickel.** P. A. Helmbold. *Corrosion et Anticorrosion,* v. 4, no. 8, Sept. 1956, p. 271-275.

Determining various values of cathodic protection of nickel against the corrosive action of caustic alkalies requires a perfect knowledge of the factors determining the amount of corrosion. Some factors defined. (R5, R10, Ni)

514-R. (French.) **Mechanical and Metallurgical Factors of Humid Metal Corrosion. Relationship Between Intergranular Corrosion and the Structure of the Grain Joints.** P. Lacombe. *Métaux, Corrosion-Industries,* v. 31, no. 373, Sept. 1956, p. 337-354.

Structural and mechanical causes of electrochemical corrosion and remedies. Comparison of 70-30 brass with 18-8 stainless steel and aluminum-magnesium alloys in respect to corrosion. Attraction of atoms of impurities by grain joints as essential causes of metal and alloy brittleness. (R1, R2, Cu, Al, Mg, SS)

515-R. (French.) **Protection of Buried Pipes Against Corrosion.** J. Callais. Paper from "XXVIII Congreso Internacional de Quimica Industrial". v. I. Saez, p. 336-342.

Pipelines in Southwestern France protected against soil action by cathodic protection; efficiency of the method. (R10, ST)

516-R. (French.) **Toward a New Hypothesis on Intergranular Corrosion of Austenitic Stainless Steels.** J. Hochmann. Paper from "XXVIII Congreso Internacional de Quimica Industrial". v. I. Saez, p. 364-366.

A heterogeneous composition and high carbon concentration may exist in the crystal boundaries of 18-8 stainless steels. During welding, carbons and carbides are precipitated "in situ" with no chromium diffusion. (R2, SS)

517-R. (Italian.) **Action of Some Organic Compounds on Acid Dissolution of Monocrystalline Zinc of High Purity.** L. Cavallaro and G. P. Bolognesi. *Metallurgia Italiana,* v. 48, no. 9, Sept. 1956, p. 393-400.

Effects of the "wetting" factor on the dissolution of the (0001) surface of zinc in presence of sulphuric acid. Inhibitors used included thiourea derivatives and some isosulphocyanates, together with ethyl alcohol. (R10, R6, Zn)

518-R. (Russian.) **Effect of Certain Organic Compounds on the Solubility Ratio of Carbon Steel in Inorganic Acids.** S. A. Balezin and M. A. Ignat'eva. *Doklady Akademii Nauk SSSR,* v. 109, no. 4, Aug. 1, 1956, p. 771-773.

Effect of inhibitors on corrosion of steel in sulphuric and hydrochloric acids. (R10, R6, ST)

519-R. (Russian.) **The Mechanism of Corrosion Cracking in Austenitic Steels.** A. V. Riabchenkov and V. M. Nikiforova. *Metallovedenie i Obrabotka Metallov,* no. 8, Aug. 1956, p. 2-11.

Electrochemical factors are very important in initiating and developing corrosion cracking. Claims a potential difference is the basic cause of failure. (R1)

520-R. (Spanish.) **Tests on the Sensitiveness to Intercrystalline Corrosion of 18-8 Stainless Steels.** Francisco Joanxich Ayma. Paper from "XXVIII Congreso Internacional de Quimica Industrial". v. I. Saez, p. 367-371.

Preparation of test samples, study of various processes and comparison of results aiming to simplify corrosion tests for stainless steels and to reduce the testing time from 48 hr. to 15 or 20 min. (R11, R2, SS)

521-R. The Reactions of Molten Sodium Hydroxide With Various Metals. D. D. Williams, J. A. Grand and R. R. Miller. *American Chemical Society, Journal,* v. 78, Oct. 20, 1956, p. 5150-5155.

Chemical reaction data on metal-sodium hydroxide systems which explain corrosion and mass transfer in such systems. (R6)

522-R. The Protection of Cable Sheathing. The "Phenol Corrosion" of Lead. E. L. Coles and R. L. Davies. *Chemistry & Industry,* 1956, no. 39, Oct. 6, 1956, p. 1030-1035.

Corrosion previously ascribed to phenolic compounds may be caused by low molecular weight aliphatic acids. Factors leading to corrosion associated with coal tar impregnants are indicated. (R7, Pb)

523-R. The Protection of Cable Sheathing. Cathodic Protection of Telecommunication Cables. J. Gerrard and J. R. Walters. *Chemistry & Industry,* 1956, no. 40, Oct. 13, 1956, p. 1060-1068.

The incidence of and methods of combating corrosion damage to telecommunication cables. Electrical surveys and instrumentation. (R10, Pb)

524-R. The Protection of Cable Sheathing. The Protection of Buried Power Cables Against Corrosion. *Chemistry & Industry,* 1956, no. 4, Oct. 13, 1956, p. 1069-1076.

Investigation of cases in which corrosion occurred enabled necessary remedial measures to be determined and indicated causative conditions. (R10)

525-R. The Stress-Corrosion Cracking of Austenitic Stainless Steels. II. Fully Softened, Strain-Hardened and Refrigerated Material. J. G. Hines and T. P. Hoar. *Iron and Steel Institute, Journal,* v. 184, Oct. 1956, p. 166-172.

Plastic strain or subzero treatment applied to fully softened plain 18-8 steel reduced the time to fracture at any particular applied stress and increased the density of cracking. (R1, AY)

526-R. Growth of External Copper Layers During the Internal Oxidation of Dilute Cu-Al Alloys in a Cu_2O-Cu Pack. D. L. Wood. *Journal of Metals,* v. 8, sec. 2, *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Oct. 1956, p. 1252-1256.

Experimental data suggest that the Cu_2O is vaporized as molecules, which are dissociated at the oxygen-absorbing surface. (R2, J23, Cu, Al)

527-R. On the Ordering Effects in the Corrosion of Cu_3Au by Aqueous Ferric Chloride. H. Papazian and Robert A. Lad. *Journal of Metals,* v. 8, sec. 2, *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, Oct. 1956, p. 1340.

Some recent results obtained in the study of the rates of corrosion of ordered and disordered polycrystalline Cu_3Au. (R5, N10, Cu, Au)

528-R. Using Stainless Steels for Corrosion Resistance. Richard Paret. *Machine Design,* v. 28, Oct. 18, 1956, p. 114-121.

Types of stainless steel, types of corrosion, design considerations, fabricating to minimize corrosion, anticipating corrosion during operation. (R general, SS)

529-R. Hydrazine—for Boiler-Feedwater Treatment. Eric R. Woodward. *Power,* v. 100, Nov. 1956, p. 80-82.

Treatment with hydrazine reduces scale deposit and corrosion, producing feedwater of slight alkalinity, zero-dissolved solids and complete absence of free oxygen. (R10)

530-R. (German.) **Our Contemporary Conceptions of Electrochemical Mechanism of Corrosion. II.** W. Schwarz. *Metall,* v. 10, no. 19-20, Oct. 1956, p. 921-925.

Effect of inhibitors, of materials which decrease the metal ion concentration. Passivity. (R1, R10)

531-R. (German.) **Corrosion of Titanium and Its Alloys.** O. Rüdiger, R. W. Fischer and W. Knorr. *Technische Mitteilungen Krupp,* v. 14, no. 4, Sept. 1956, p. 82-87.

Corrosion behavior of titanium. Electrochemical investigation. Corrosion properties of titanium alloys. (R general, Ti)

532-R. (German.) **Oxidation of Titanium.** W. Kinna and W. Knorr. *Technische Mitteilungen Krupp,* v. 14, no. 4, Sept. 1956, p. 99-104.

Oxidation behavior at 800, 1000 and 1200° C. (R2, Ti)

533-R. (Italian.) **The Problem of Intercrystalline Corrosion of Al-Mg Wrought Alloys.** E. Hugony and M. Monticelli-Papania. *Alluminio,* v. 25, no. 9, Sept. 1956, p. 373-384.

Tests show that the quantity of magnesium must not exceed 4.5%. (R2, Al, Mg)

534-R. (Russian.) **The Effect of Molten Lithium, Sodium, and Potassium Nitrates on Nickel, Copper, Dur-**

alumin, and Certain Steels. E. I. Gurovich. *Zhurnal Prikladnoi Khimii,* v. 29, no. 9, Sept. 1956, p. 1358-1365.

Quantitative data on the effect of molten alkali nitrates of certain metals and alloys. The effect manifests itself in two parallel processes: dissolution of the metal and formation of films on its surface. (R6, Ni, Cu, Al, ST)

535-R. (Russian.) **Composition of Rust Formed on Iron Contacting Air and Water.** I. V. Krotov. *Zhurnal Fizicheskoi Khimii,* v. 39, no. 8, Aug. 1956, p. 1696-1701.

Up to 149° C. the rust consists of γ-FeOOH; at higher temperatures it probably is transformed into γ-Fe_2O_3 which terminates at 290° C.; at 676° C. the γ-Fe_2O_3 is entirely transformed into α-Fe_2O_3. (R3, R4, Fe)

536-R. (Russian.) **Electrochemical Protection of Duralumin.** V. V. Gerasimov and I. L. Rozenfeld. *Zhurnal Fizicheskoi Khimii,* v. 30, no. 8, Aug. 1956, p. 1816-1820.

Effect of protective circuit potential on the speed and depth of corrosion penetration. (R10, Al-h)

537-R. The Protection of Cable Sheathing. The Behaviour of Aluminium Sheathed Cables. P. A. Raine. *Chemistry & Industry,* 1956, no. 41, Oct. 20, 1956, p. 1102-1111.

Performance criteria, choice of material, behavior in water and soil, protection against corrosion. (R8, R4, R3, Al)

538-R. The Protection of Cable Sheathing. The Mechanism of Corrosion of Metal Pipes in Soils and Practical Methods of Prevention. W. W. Robson and A. R. Taylor. *Chemistry & Industry,* 1956, no. 41, Oct. 20, 1956, p. 1111-1119.

Specimens were buried in trenches representing clay, chalk, peat, made-up ground, sandy loam, brackish silt and ashes, and were checked for corrosion in 1, 3 and 10 years. (R8, Pb)

539-R. Laboratory Method for Corrosion Inhibitor Evaluation. G. A. Marsh and E. Schaschl. *Corrosion,* v. 12, Nov. 1956, p. 534-538.

A rotating bottle test is described, using as an example the comparison and evaluation of two gasoline rust inhibitors. (R10)

540-R. A Simple Phase Equilibrium Approach to the Problem of Oil-Ash Corrosion. W. R. Foster, M. H. Leipold and T. S. Shevlin. *Corrosion,* v. 12, Nov. 1956, p. 539-548.

The diagram resulting from investigation of the compatibility relationships in the system Na_2O-SO_3-V_2O_5 provides a reliable basis for the correlation of previous and current studies of residual fuel-oil ash corrosion. (R7, M24)

541-R. Potential Criteria for the Cathodic Protection of Lead Cable Sheath. K. G. Compton. *Corrosion,* v. 12, Nov. 1956, p. 553-560.

Anodic and cathodic polarization curves in representative soils, using a null bridge technique, are given to illustrate the potential changes accompanying corrosion and cathodic protection. (R10, Pb)

542-R. Structure of Oxide Scales on Nickel-Chromium Steels. H. J. Yearian, H. E. Boren, Jr., and R. E. Warr. *Corrosion,* v. 12, Nov. 1956, p. 561-568.

Structure of the scales formed on a series of typical steels when oxidized for 100 hr. in air at temperatures from 1600 to 2200° F. were investigated by X-ray diffraction methods. (R2, AY)

543-R. Corrosion of Metals by Liquid Fertilizer Solutions. D. C. Vreeland and S. H. Kalin. *Corrosion,* v. 12, Nov. 1956, p. 569-575.

Aluminum, carbon steel, chromium and chromium-nickel stainless steels were tested to evaluate their suitability as constructional materials for storage, transport and applicator tanks for "nitrogen" and "complete-mix" liquid fertilizers. (R6, Al, Cr, ST, SS)

544-R. Fundamentals of Cathodic Protection. II. John H. Morgan. *Corrosion, Prevention and Control,* v. 3, Oct. 1956, p. 33-37.

Method of preventing the corrosion of buried or immersed metals; explanation of its mechanism and uses. (R10, Zn, Mg)

545-R. Two-Step Process Retards White Rust. L. J. Brown. *Iron Age,* v. 178, Nov. 8, 1956, p. 106-109.

Formation of a relatively stable, water-repellent film on the surface of galvanized steel and a second dip in a chromic-type solution improves protection against water and condensed moisture. (R10, Zn)

546-R. Structure Dependent Chemical Activity of Polycrystalline Cu_3Au—Experiments Relating to the Mechanism of Stress-Corrosion Cracking of Homogeneous Solid Solutions. Robert Bakish and William D. Robertson. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, sec. 2, Oct. 1956, p. 1277-1282.

Oxidation of copper by ferric chloride at structural sites was investigated. Copper is selectively removed from the alloy at grain boundaries, incoherent twin boundaries and deformation bands, irrespective of the state of order. (R1, M27, Cu, Au)

547-R. Selection and Application of Corrosion Inhibitors. J. D. Crawford. *Producers Monthly,* v. 20, Oct. 1956, p. 22, 24-26.

Inhibitors in oil industry, corrosive oil wells, determining corrosion rates, protection, pellet-type inhibitors, flushing systems. (R10)

548-R. (French.) **New Researches on the Initial Oxide Formation in Slow Copper Oxidation.** Finn Gronlund. *Journal de Chimie Physique*, v. 53, no. 7-8, July-Aug. 1956, p. 660-666.

The conditions of initial formation of copper oxide on particular points of metallic surfaces were quantitatively studied in relation to its mechanism. (R2, Cu)

549-R. (German.) **On the Cathodic Protection in Soils by the Galvanic Method.** I. T. Markovic. *Werkstoffe und Korrosion,* v. 7, no. 10, Oct. 1956, p. 566-570.

Electrode processes on short circuited electrodes of iron, zinc and magnesium. Degree of saturation of water of the soil. (R10, Fe, Zn, Mg)

550-R. (Book.) **Bibliographic Survey of Corrosion, 1952-1953.** 382 p. 1956. National Association of Corrosion Engineers, 1061 M & M Bldg., Houston 2, Tex. $12.50.

Compilation of abstracts on all aspects of corrosion. (R general)

SECTION S

INSPECTION and CONTROL

1-S. Limitations of Steel Specifications. E. H. Snyder. *Metal Progress,* v. 68, Nov. 1955, p. 76-80.

Steel specifications can be misleading for the range is often too wide or some unmentioned property can cause processing difficulties. Tables, graphs, photograph. (S22, ST)

2-S. Longer Life for Chromel-Alumel Thermocouples. N. F. Spooner and J. M. Thomas. *Metal Progress,* v. 68 Nov. 1955, p. 81-85.

Errors that develop in Chromel-Alumel thermocouples can be minimized or prevented by inserting titanium as an oxygen getter, and hermetically sealing the assembly. Micrographs, tables, photographs. (S16)

3-S. Determining Significant Differences. C. H. Li. *Metal Progress,* v. 68, Nov. 1955, p. 104B, 105.

Simple method for evaluating differences in test results and determining whether they are real or due to chance alone. Nomograph. (S12)

4-S. Radioactive Materials and Their Application in Industry. A. D. Merriman. *Metal Treatment and Drop Forging,* v. 22, Oct. 1955, p. 433-437.

Considers applications encompassing ionization effect, radiography and tracer technique. Photographs, table, diagram. (S19, EG-h)

5-S. Equipment Failure Due to Heat. D. J. Bergman. *Petroleum Processing,* v. 10, Nov. 1955, p. 1729-1736.

Explains temperature gradient stress, its effects and its calculation; six metal failure problems and their solutions. Diagrams. 9 ref. (S21)

6-S. Testing Welded Metal Joints. S. W. Hollingum. *Metal Industry,* v. 87, Nov. 18, 1955, p. 429-432.

Nondestructive testing by gamma-ray, ultrasonic and electromagnetic flow methods. Photographs, diagrams. (S13)

7-S. Optical Tooling Speeds Gage Set-Up. W. L. Egy. *Metal-Working,* v. 11, Dec. 1955, p. 8-9.

Description and operation of the Brunson optical transit square. Techniques for accurately positioning large plates. Photographs, diagrams. (S14)

8-S. Problems in Metrology. C. Minaire. *Metalworking Production,* v. 99, Nov. 4, 1955, p. 1865-1871.

Solutions to measuring problems, including special gages for internal and external tapers and unusual uses of sine bars. Diagrams. (S14)

9-S. Specifications for Mild Steels. J. K. Honeyman. *Sheet Metal Industries,* v. 32, no. 343, Nov. 1955, p. 855-859.

Considers what should be included in a steel specification so that the purchaser may be protected without additional unnecessary testing. Photographs, micrographs, table. 2 ref. (S22, CN)

10-S. Gamma-Radiographic Control of Welded Transmission Pipelines. C. C. Bates. *Welding and Metal Fabrication,* v. 23, Nov. 1955, p. 420-426.

Increasing and successful application of iridium-192 radioactive sources together with welding supervision in United Kingdom. Photographs, diagrams, graphs, table. (To be continued.) (S19, K9, Ir)

11-S. (Swedish.) **A Method for Simultaneous Determination of Carbon and Sulfur.** Lars Bjerkerud. *Jernkontorets annaler,* v. 139, no. 19, 1955, p. 847-852.

Apparatus for simultaneous determination of carbon and sulphur in steel. Diagrams, photograph, tables. 5 ref. (S11, ST)

12-S. (Polish.) **Statistical Analysis of the Shape of Die Cast Test Pieces.** Aleksander Krupkowski, Zbigniew Lech and Jan Wozniacki. *Archiwum gornictwa i hutnictwa,* v. 3, no. 3, 1955, p. 317-344.

A five-fold test piece is proposed for the inspection testing of die cast alloys. A 2.5-fold test piece is recommended when it is possible to increase the thickness and gage length of test pieces. Diagrams, graphs, tables. 18 ref. (S12, E13, Q27)

13-S. (German.) **Application of Statistical Methods in Iron and Steel Works.** Gerolf Strohmeier and Hans Richter. *Stahl und Eisen,* v. 75, no. 22, Nov. 3, 1955, p. 1494-1501.

Calculation of variables and its importance in handling problems. Precise records are preliminary condition for application of mathematical-statistical methods. Diagrams, graphs. 3 ref. (S12)

14-S. The Application of Radio-Frequency Induction Heating to the Determination of Total Carbon in Cast Iron and Other Ferrous Alloys. W. E. Clarke and R. Rew. *British Cast Iron Research Association, Journal of Research and Development,* v. 6, Oct. 1955, p. 60-69 + 6 plates.

The analysis train arrangement is presented with some preliminary work on the effect of the catalyst. Work was done to establish the effect of different fluxes. Diagrams, tables, photographs. 3 ref. (S11, CI)

15-S. Precise Measurement of the Diameter of Fine Wires. I. G. Morgan. *Engineer,* v. 200, Nov. 4, 1955, p. 646-647.

Apparatus will measure fine wire up to about 0.01 in. in diam. to an accuracy of ± 0.00001 in. A pivoted beam carries an anvil which contacts the wire. The angle of tilt of the beam is measured by a mirror and autocillimator from which the wire diameter is determined. Diagrams, photograph. (S14)

16-S. Magnetic Particle Inspection Standards. John B. Caine. *Foundry,* v. 83, Dec. 1955, p. 84-89.

Acceptance or rejection of a casting should not depend solely on the presence of defects. Diagrams, graphs, photographs. 3 ref. (S13)

17-S. Gas Analysis in Steel Mills. R. R. Swain and J. A. Hays. *Instruments and Automation,* v. 28, Nov. 1955, p. 1940-1944.

Methods of adapting gas analysis equipment in steel mills. Graph, diagrams, photographs. (S11)

18-S. Pinholes in Thin Steel and Pinhole Detecting Apparatus. G. H. Rendel. *Iron and Steel Engineer,* v. 32, Nov. 1955, p. 57-64; disc., p. 64.

Review of pinhole detectors, discussion of new developments. Diagrams, photographs. (S13, ST)

19-S. An X-Ray Tin Thickness Gage for the Electrolytic Tin Line. R. R. Webster. *Iron and Steel Engineer,* v. 32, Nov. 1955, p. 65-71; disc., p. 71-72.

Gage can be mounted directly on the tinning line to give a continuous record of coating weight. Diagrams, graphs, photographs. 2 ref. (S14, L17, Sn)

20-S. Reel Control Systems for Mills and Process Lines. A. J. Winchester, Jr. *Iron and Steel Engineer,* v. 32, Nov. 1955, p. 125-134; disc., p. 134.

Magnetic amplifiers fit precision requirements for reel control in hot and cold rolling of metal strip. Graphs, diagrams, photographs. (S18, F23)

21-S. International Standards for Wrought Light Alloys. *Light Metals,* v. 18, Nov. 1955, p. 375-376, 377-379.

Tabulates ASTM specifications for aluminum and magnesium alloys and gives data for converting from trade designations to Aluminum Association coding. Tables. (To be continued.) (S22, Al)

22-S. Characteristics of Investment Casting Alloys. William W. Lamb and W. Fred Carn. *Machine Design,* v. 27, Dec. 1955, p. 209-210.

Castability, mechanical properties, fabrication characteristics of various alloys. Tables. (S22, E15)

23-S. Uses of Vibrational Waves in Metallurgical and Mineral Dressing Processes. J. K. Almond. *Metal Treatment and Drop Forging,* v. 22, Nov. 1955, p. 475-480.

Industrial applications. Photographs, 46 ref. (S13, B14)

24-S. Measurement of Fine Wire by Autocollimator. I. G. Morgan. *Metalworking Production,* v. 99, Nov. 18, 1955, p. 1957-1959.

Reaches an accuracy of ± 0.00001 in. or better. Diagram, photograph. (S14)

25-S. Flying Spot Microscope. D. Causley and J. Z. Young. *Research,* v. 8, Nov. 1955, p. 430-434.

Outlines flying spot method and discusses counting of total numbers of particles of all sizes, as well as size distribution. Diagrams, photographs, tables. 4 ref. (S14, H11)

26-S. On the Theory of Measuring Thickness by Absorption of Radioactive Rays. A. M. Bogachev, B. I. Verkhovskii and A. N. Makarov. *Henry Brutcher Translation No.* 3602, 10 p. (From *Zavodskaya laboratoriya,* v. 21, no. 7, 1955, p. 808-812). Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 273-S, 1955. (S14, S19)

27-S. Photometric Determination of Acid-Soluble and Acid-Insoluble Aluminum in Steel. K. Wacykiewicz. *Henry Brutcher Translation No.* 3609, 5 p. (From *Biuletyn informacyjny (Hutnik),* v. 6, no. 2, 1955, p. 7-8.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 78-S, 1955. (S11, Al, ST)

28-S. (French.) **Apparatus for Testing the Soundness of Metallic Pieces by Ultrasonic Echos.** M. Beaujard. *Centre de Documentation Sidérurgique, Circulaire d'Informations Techniques,* v. 12, no. 10, 1955, p. 2013-2021.

Examines four different apparatuses using ultrasonic impulses: Hughes, Siemens, Metalloradar "L", and Krautkrämer. (S13)

29-S. (Russian.) **Polarographic Determination of Copper, Iron, Cadmium, and Lead in Zinc.** *Collection of Czechoslovak Chemical Communications,* v. 26, no. 4, 1955, p. 858-862.

Polarographic effect of above elements in 0.08 *N* ethylenediaminetartrate and 0.08 *N* potassium pyrophosphate solutions in presence of higher zinc concentration. A practical application of a method for determination of copper, iron, lead, and cadmium in zinc, zinc dust and zinc alloys suggested. Table, graphs. 15 ref. (S11, Cd, Cu, Fe, Pb, Zn)

30-S. (Book.) **ASTM Specifications for Steel Piping Materials.** 425 p. 1955. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. $4.00.

Specifications for pipe, tubes, castings, forgings, and bolting. (S22, ST)

31-S. Analysis of Oxygen and Nitrogen in Uranium. Cecil B. Griffith, William M. Albrecht, and Manley W. Mallett. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* BMI-1033, Aug. 1955, 8 p.

Evaluates reliability of the vacuum-fusion and Kjeldahl methods used in uranium analysis. Tables. 5 ref. (S11, U)

32-S. Methods for Measuring the Hydrogen Content of Weld Metal. P. D. Blake. *British Welding Journal,* v. 2, Dec. 1955, p. 558-561.

Laboratory methods for measuring diffusible and residual hydrogen contents of ferrous weld metal. These two values can be determined separately by collecting the diffusible hydrogen under mercury at room temperature and subsequently extracting the residual hydrogen by vacuum heating; alternatively, the total hydrogen may be determined in a single step by vacuum heating. Diagrams. (S11, K9, ST)

33-S. Pneumatic Comparator for Measuring Variation in Diameter of Bores. I. G. Morgan and D. C. Barnes. *Engineer,* v. 200, Dec. 2, 1955, p. 795-796.

In conjunction with a suitable reference standard of size it may be used for the absolute determination of diameter. An accuracy of ± 0.00001 in. (±0.25μ) is achieved. Graphs, photographs, diagrams. 4 ref. (S14)

34-S. The Application of Spectrographic Solution and Powder Methods to the Analysis of Miscellaneous Samples. P. T. Beale and Daphne A. Poynter. *Metallurgia,* v. 52, no. 313, Nov. 1955, p. 253-261.

Practical experiences with the various techniques and specific applications of several methods. Diagrams, tables. 16 ref. (S11)

35-S. Gas Analyzers for Efficient Furnace Operation. E. C. Lang. *Metal Treating,* v. 6, Nov.-Dec. 1955, p. 10 + 5 pages.

Flexible, portable-type instrument provides information regarding conditions in all phases of combustion processes in all parts of the furnace. Diagrams, photographs, graphs, table. (S11)

36-S. Ultrasonic Inspection Speeds Drive-Tubing Output. Leo Adams. *Metalworking Production,* v. 99, Nov. 11, 1955, p. 1905-1907.

Equipment, methods and advanages of continuous inspection of 3-in. steel tubing weld quality. Photographs, diagram. (S13, CN)

37-S. (French.) **Some Aspects of Utilizing Radioactive Elements. II.** Roland Muxart. *Revue générale des sciences pures et appliquées,* v. 62, nos. 7-8, July-Aug. 1955, p. 202-221.

Application of radioactive isotopes in industrial research, particularly ferrous metallurgy, glass and ceramic works, mechanical engineering. Table. 175 ref. (S19)

38-S. (German.) Recent Experiences in the Measurement of the Dust Content of Industrial Gases. Kurt Guthmann. *Stahl und Eisen,* v. 75, no. 23, Nov. 17, 1955, p. 1571-1582.

Techniques for quantitative measurement of dust content. Diagrams, graphs, tables, photographs. 16 ref. (S11)

39-S. An Improved Barium Sulphate Method for the Determination of Sulphur in Steel. B. Bagshawe and A. L. Pill. *Analyst,* v. 80, Nov. 1955, p. 796-802.

Modified and simplified procedure in which hydroxylamine hydrochloride is used to decompose residual nitrate. This modified procedure is applicable, without loss of accuracy, in all ranges of chromium content and to all classes of highly alloyed steel, with the exception of steels of high titanium content. The precision of determination is within 0.002% of sulphur in all normal sulfur ranges. Tables. 4 ref. (S11, ST)

40-S. Temperature-Indicating Material Used for Weld Inspection. D. Lichtman. *Iron Age,* v. 176, Dec. 8, 1955, p. 146-147.

New, fast method of weld inspection using an optical scanning device and a temperature-indicating material is well-suited to automatic production by inert gas-shielded arc welding. Up to 12,000 welds can be examined in an hour. Photographs, diagram. (S16, ST)

41-S. Spectrographic Determination of Residual Elements in Steel. *Iron and Steel Institute, Journal,* v. 181, Dec. 1955, p. 316-318.

Method for determination of vanadium, molybdenum, cobalt, tin and titanium, using a low-voltage intermittent-arc source unit. Diagrams, tables. 7 ref. (S11, ST)

42-S. Application of Radioactive Tracers in the Petroleum Industry. *Lubrication,* v. 43, Dec. 1955, p. 133-144.

Presents background information for understanding properties of radio-active isotopes which make them useful as tracers. Successful applications in the petroleum industry with the main emphasis on lubrication problems. Tables, diagrams, photographs, graphs. 40 ref. (S19, Q9)

43-S. Commercial Tolerances for Compression Springs. I. *Mainspring,* v. 16, Dec. 1955, p. 3-6.

Tolerances for coil and spring diameters, free length and commercial load. Tables, diagram. (S22)

44-S. Materials Engineering File Facts. Standard Brazing Filler Metals. *Materials & Methods,* v. 42, Dec. 1955, p. 137, 139.

Classification, composition, properties, forms and uses of aluminum, copper, silver, magnesium and gold brazing alloys. (S22, K8, Zn, Al, Cu, Au, Mg, Ag, Ni)

45-S. A Simple Coulometer Method for Tin Coating Determination. J. Monvoisin and M. Le Blanc. *Tin and Its Uses,* 1955, no. 33, p. 3-5.

Apparatus which permits rapid measurement of free tin and alloyed tin with a good degree of accuracy. Diagram, photograph. 5 ref. (S14, L16, Sn)

46-S. Gamma-Radiographic Control of Welded Transmission Pipelines. II. C. C. Bates. *Welding and Metal Fabrication,* v. 23, Dec. 1955, p. 465-471.

Discussion of staffing, records and economics of project. Diagrams, graphs, tables, photographs. 10 ref. (S13, S19, ST)

47-S. (Czech.) Measuring Sheet Thickness During Cold Rolling. F. Wiesner. *Strojirenstvi,* v. 5, no. 10, Oct. 1955, p. 779-785.

Mechanical, electrical and optical equipment for direct contact measurement; pneumatic, magnetic, ultrasonic and X-ray apparatus as indirect contact devices. Methods of combining continuous measurement with automatic control to insure even thickness. Diagrams. 8 ref. (S14, F23, ST)

48-S. (French.) Ultrasonic Detection of Internal Defects of Rails. The Sonirail. J. Palme. *Revue de métallurgie,* v. 52, no. 9, Sept. 1955, p. 711-717.

Detection of internal cracks is accomplished by both the sound signal intensity and its frequency. Micrographs, photograph. (S13, ST)

49-S. (Russian.) Introduction Into Industry of Tungsten-Molybdenum Thermocouples for Measurement of Liquid Steel Temperatures. S. K. Danishevskii. *Stal',* v. 15, no. 11, Nov. 1955, p. 984-989.

An inexpensive thermocouple to determine temperatures up to 2400° C. for short periods. Photographs, table, graphs, diagrams. 4 ref. (S16)

50-S. (Russian.) Temperature Control of Steel During Pouring. V. G. Gruzin. *Stal',* v. 15, no. 11, Nov. 1955, p. 989-993.

Application of tungsten-molybdenum thermocouple for constant control of temperature in the ladle making possible casting at an optimum temperature. Tables, diagrams, photographs. 4 ref. (S16, D9, Fe, ST)

51-S. (Russian.) **Radioactive Isotopes in Technology.** P. E. D'iachenko. *Vestnik akademii nauk SSSR,* v. 25, no. 10, Oct. 1955, p. 39-47.

Application of isotopes in metallurgy, machine construction, wear of machine parts, corrosion, machining, nondestructive tests, bio-chemistry and soil science. (S19)

52-S. Xeroradiography. Peter J. Farmer. *Aircraft Production,* v. 18, Jan. 1956, p. 8-12.

A new technique being developed to overcome some of the limitations of radiographic examination. Diagrams, graphs, micrographs, photographs. (S13)

53-S. Ultrasonics—How It Works and What It Does. Alexander Murdoch, Jr. *American Machinist,* v. 100, Jan. 2, 1956, p. 97-104.

Principles of operation, equipment and power necessary, factors to be considered in developing apparatus suitable for large-scale commercial application. Photographs, micrographs, table, diagram, graphs. (S13)

54-S. Colorimetric Determination of Molybdenum in Tungsten-Bearing Steels. Lewis J. Wrangell, Edward C. Bernam, Donald F. Kuemmel and Origen Perkins. *Analytical Chemistry,* v. 27, Dec. 1955, p. 1966-1970.

Results for tungsten-bearing standards and mixtures of standards which contain maxima of approximately 9% molybdenum, 18% tungsten, 19% chromium and 5% cobalt. Included are results for a number of compositions which simulate various trade steels. Tables, graphs. 10 ref. (S11, Mo, TS)

55-S. Industrial Applications of Ultrasonics. E. G. Richardson. *British Journal of Applied Physics,* v. 6, Dec. 1955, p. 413-415.

Possibilities and limitations of ultrasonics for echo-detection, high-frequency agitation and metallurgical applications. Photographs, diagrams. 6 ref. (S13)

56-S. A Tramp-Metal Detector. M. H. Goosey. *E. I. Du Pont de Nemours & Co. (U. S. Atomic Energy Commission),* DP-135, Oct. 1955, 12 p.

Iron particle volumes of 3×10^{-4} cubic in. are easily detected inside an alloy rod 1 in. in diam. Photographs, diagrams. (S10, S13, Fe)

57-S. Titrimetric Determination of Zirconium. M. O. Fulda and J. S. Fritz. *Iowa State College, Ames Laboratory (U. S. Atomic Energy Commission),* ISC-596, Mar. 1955, 24 p.

Brief literature survey of gravimetric, colorimetric, volumetric, spectrographic methods. Tables. 68 ref. (S11, Zr)

58-S. High-Speed Unit Performs Three-Way Inspection. *Iron Age,* v. 176, Dec. 15, 1955, p. 100-102.

Continuous electromagnetic analysis of nonmagnetic or paramagnetic materials now appears feasible at speeds in excess of 300 ft. per min. Nondestructive technique is more sensitive and reveals more information than previous methods. Photographs. (S13, ST)

59-S. Device Improves Thermocouple Pyrometer Operation. D. H. Jones. *Iron Age,* v. 176, Dec. 15, 1955, p. 108-109.

Annealing practices are improved by equipment for detecting and temporarily repairing thermocouple circuit faults. Photographs. (S16, J23)

60-S. Determination of Magnesium in Nodular Cast Iron by Spectrographic Analysis. B. C. Kar and M. K. Gupta. *Journal of Scientific & Industrial Research,* v. 14, sec. B, Nov. 1955, p. 570-572.

Determination of small amounts by a spectrochemical method using standard metal electrodes. Graph, tables. 2 ref. (S11, Mg, CI)

61-S. Testing Porosity, Adhesion and Hardness. Walter H. Prine. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 482-485.

Production testing procedures presented will permit a reasonable degree of control of deposits. 7 ref. (S13, L17, Q29)

62-S. Thickness Testing of Electrodeposits. Everett A. Hodges. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 486, 488-495.

Outlines microscopic, weight-area, hydrochloric acid spot test, micrometer, magnetic, anodic solution, dropping, jet test methods. Graphs, 13 ref. (S14, L17)

63-S. Chemical Analysis of Plating Solutions. Nathaniel Hall. *Metal Finishing (Guidebook—Directory Ed.),* 1956, p. 509-525.

Simple, accurate, rapid analytical methods adaptable for most all plating room control. (S11, L17)

64-S. Field Evaluation of Industrial Xeroradiography. Grover M. Taylor and Gerold H. Tenney. *Nondestructive Testing,* v. 13, Nov.-Dec. 1955, p. 12-17.

Data on radiographic resolution, sensitivity and speed in which various energies were used. Photographs, diagrams, micrographs, tables. 3 ref. (S13, Al, ST)

65-S. A High Power Industrial Fluoroscopic Tube. D. T. O'Connor and E. L. Criscuolo. *Nondestructive Testing,* v. 13, Nov.-Dec. 1955, p. 18-19, 26.

Describes failures and successes of two unusual X-ray tube designs which permit target loading many times greater than that of conventional tubes. Photographs, diagram. (S13)

66-S. Selection of Sources for Radiographic Use. Marvin G. Schorr. *Nondestructive Testing,* v. 13, Nov.-Dec. 1955, p. 20-22, 26.

Characteristics of the more common isotopes as they offset radiography; costs of sealed sources; selection of source for different applications. Tables, graphs. (S13)

67-S. The Relationship of Nondestructive Testing to Quality Control. William P. Farnsworth. *Nondestructive Testing,* v. 13, Nov.-Dec. 1955, p. 28-30, 34.

Relationship of nondestructive testing to the management function and responsibilities of quality control; some aspects of sampling which can contribute to efficient utilization of test methods. (S12)

68-S. Practical Conductivity Measurement for the Electrical Industry. William A. Cannon, Jr. *Nondestructive Testing,* v. 13, Nov.-Dec. 1955, p. 32-34.

Applications of the Magnatest FM-100 conductivity meter to maintain close control over casting and heat traveling techniques in nonferrous foundries, sorting mixed alloys and in the electrical hardware industry. Photographs, table.
(S general, E general)

69-S. (Book.) **Magnets and Magnetic Measuring Techniques.** R. K. Wakerling and A. Guthrie, editors. 213 p. 1949. Office of Technical Services, Dept. of Commerce, Washington 25, D. C. $1.45.

Four papers on design requirements, instruments, performance of model magnets, and tests on full-scale magnets. (S general, T8)

70-S. (Book.) **Chemical and Spectrographic Analysis of Magnesium and Its Alloys.** A. Mayer and W. J. Price. Sections individually paged. 1954. Magnesium Elektron Ltd., Manchester, England.

A compilation of recommended analytical procedures including chemical and physico-chemical methods and the theory and practice of spectrographic analysis. (S11, Mg)

71-S. Gauging Thin Films. *Automobile Engineer,* v. 45, Dec. 1955, p. 573-575.

Instruments to measure, unilaterally, the metallic or nonmetallic coatings on metal bases. Photographs. (S14)

72-S. Selective Standardization and Status of Specifications for Titanium Mill Products. *Battelle Memorial Institute, Titanium Metallurgical Laboratory Report No.* 22, Nov. 1955, 16 p.

Survey of status of wrought metal specifications to cover high-strengh sheet for fabrication by aircraft and guided-missile manufacturers. Recommendations for selective standardization of titanium sheet stock. (S22, Ti)

73-S. The 1955 Specification Revisions. E. Elliott. *Light Metals,* v. 18, Dec. 1955, p. 409-412.

Composition and mechanical properties of aluminum alloys and a guide to the selection of casting alloys. Tables. (S22, Al)

74-S. Examining Irradiated Fuels Under Water. Henry J. Bellarts, John L. Spencer and Roy S. Peterson. *Nucleonics,* v. 14, Jan. 1956, p. 30-33.

Primary inspection station, slug cleaner, dejacketer of underwater inspection station. Photograph, diagrams. (S13, U)

75-S. Detecting Flaws in Traction Gears. *Railway Locomotives and Cars,* v. 129, Dec. 1955, p. 66-69.

Explains how many gear failures can be avoided without scrapping. Photographs. (S13)

76-S. Methods for Analyzing Titanium Sponge and Intermediate Products. P. R. Perry, R. W. Lewis and T. A. Sullivan. *U. S. Bureau of Mines, Report of Investigations* 5168, Oct. 1955, 45 p.

Concise compilation of tested chemical and spectro-chemical procedures. Tables, graphs, diagrams, photograph. 16 ref. (S11, Ti)

77-S. Electronic Measurement of Hot Rolled Wire Rod. Charles D. Gibbs. *Wire and Wire Products,* v. 31, Jan. 1956, p. 72-74, 77.

Discusses a lens-rotating prism, slit-aperature photocell system, used for rod mill control, and its place in automation. Photograph, diagram. (S18, F28)

78-S. (Czech.) **Temperature Measurement of Molten Steel by the Immersion Pyrometer at the VZKG.** J. Micek and R. Chalupa. *Hutnik,* v. 5, no. 10, Oct. 1955, p. 311-313.

Instrument gives data on temperature of bath, slag and ladle after tapping. Tables, diagrams, graphs, photograph. (S16, ST)

79-S. (French.) **Study on the Empirical Formula for the Tolerance Unit.**

E. Lechner. *Acta Technica Academiae Scientiarum Hungaricae,* v. 13, nos. 1-2, 1955, p. 243-253.

Amount of tolerance obtained by consideration of the dispersion of fabrication dimensions. Graph, table. (S12)

80-S. (French.) **Grade Data for Unalloyed Steels as Manufactured in Italy According to the Iron and Coal European Community Production Program.** G. Zanini Zazinovich. *Revue de métallurgie,* v. 52, no. 11, Nov. 1955, p. 895-908.

Properties of unalloyed Italian structural steels presented according to C.E.C.A. agreement. Tables. (S22, Q general, CN)

81-S. (German.) **Determination of the Carbon Content in Steel by Spectrum Analysis.** T. Török and G. Szikora. *Acta Technica Academiae Scientiarum Hungaricae,* v. 13, nos. 1-2, 1955, p. 165-184.

Equipment and methods for using hydrogen gas as a protective atmosphere. Diagrams, graphs. 30 ref. (S11, ST)

82-S. (German.) **New Method of Determination of the Molar Proportion of Cryolite Melts.** P. Nagy. *Acta Technica Academiae Scientiarum Hungaricae,* v. 13, nos. 1-2, 1955, p. 187-198.

Chemical analysis procedures to determine sodium and total fluorine contents of the wells. Graphs, tables, diagrams. 14 ref. (S11, C23, Al)

83-S. (German.) **New Data on Nondestructive Testing by Ultrasonics.** R. Pohlman. *Metalen,* v. 10, no. 22, Nov. 30, 1955, p. 471-473.

Details of continuous and of impulse-echo processes. Photographs, table. (S13)

84-S. (German.) **Use of Organic Reagents in Inorganic Analysis. I. Palladium Complexes of Some Anilic Acids. II. Determination of Thorium With Some Anilic Acids.** Sachindra Kumar Datta. *Zeitschrift für analytische Chemie,* v. 148, no. 4, 1955, p. 259-273.

Analytical behavior of seven anilic acids towards various metallic ions. Phthalanilic, p-tolylphthalanilic, and alpha - naphthylphthalanilic acids used successfully in quantitative determination of palladium by direct weighing method. Only the o and p-nitr-anilic acids and those from o-anisidine and alpha-naphthylamine were found suitable as analytical reagent for thorium. Tables, graph. 11 ref. (S11, Pd, Th)

85-S. (German.) **Carbon in Nonferrous Metals. I. Determination.** Joseph Fischer and Walter Schmidt. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 8, no. 11, Nov. 1955, p. 529-532.

Analysis of carbon in steels adapted to nonferrous metals with respect to pH-measurement. Graph, diagram. 2 ref. (S11, C)

86-S. (German.) **Scintillation Counting of (*n*, Alpha) and (*n*, *f*) Reaction for Isotopic Analysis of Lithium, Boron, and Uranium.** H. Wänke and E. U. Monse. *Zeitschrift für Naturforschung,* v. 10a, nos. 9-10, Sept.-Oct. 1955, p. 667-669.

Method for relative determination of accumulations of isotopes with application to scintillation counters and radium-beryllium preparation. Diagram, tables. 1 ref. (S11, Li, B, U)

87-S. (Polish.) **List of Metallurgical Standards (PN, PKN, RN, WT, and Zn, in Part).** *Wiadomosci hutnicze,* v. 11, no. 11, Nov. 1955, p. 355-358.

Standard designations of steels for forgings and various rolled shapes. Tables. (To be continued.) (S22, CN, AY)

88-S. **Determination of Hydrogen in Titanium and Titanium Alloys.** Maurice Codell and George Norwitz. *Analytical Chemistry,* v. 28, Jan. 1956, p. 106-110.

Sample is ignited in oxygen in presence of lead as a flux. Gases are passed through hot copper oxide to insure complete oxidation of the hydrogen to water and the water is collected in an Anhydrone collection tube. Diagram, tables. 68 ref. (S11, Ti)

89-S. **Automatic Gage Control Applied to Cold Reduction Mill.** W. E. Miller. *Blast Furnace and Steel Plant,* v. 44, Jan. 1956, p. 61-63.

Actual thickness measured by X-ray gage. Any difference between actual thickness and desired thickness is signaled and automatically compensated. Photographs, diagram. (S14, F23, ST)

90-S. **Proposed Tentative Standard Chemical Methods of Analysis for the Determination of Impurities in Zirconium.** E. B. Read, Helen M. Lawler and W. A. Davis. *Massachusetts Institute of Technology (U. S. Atomic Energy Commission),* MIT-1110, Mar. 1953, 77 p.

Satisfactory results have been obtained by all methods applied to the analysis of standard zirconium samples MIT-1S and MIT-CB1. Diagrams. 6 ref. (S11, Zr)

91-S. **Common Sense in Quality Control.** Harry C. Ahl. *Modern Castings,* v. 29, Jan. 1956, p. 57-61.

Programs keyed to needs and budgets of small bronze foundries with suggestions and examples of methods of controlling quality of castings without large expenditures. Shows how a simple, well-run program can be a good investment. Photographs. (S12, E general, Cu)

92-S. Ultrasonic Testing Prevents Press Crankshaft Failures. Leon Boyko. *Tool Engineer,* v. 36, Jan. 1956, p. 81-84.

By introducing sound waves at one end of a metal part and projecting the picked-up echoes on a cathode ray tube, internal flaws can be determined. Technique can be used to check tools for safety. Diagrams, table, photographs. (S13)

93-S. Developments in Automatic Quality Control. George H. Amber and Paul S. Amber. *Tool Engineer,* v. 36, Jan. 1956, p. 107-112.

Feasible installation of an automatic quality-control unit using presently available equipment. Photographs, diagram. 3 ref. (S12)

94-S. Identification of Mixed Stainless Steels. *Tool Engineer,* v. 36, Jan. 1956, p. 123-124.

Tests solution formulas. Flow diagram. (S10, SS)

95-S. Measuring to Millionths With Chrome Carbide. *Tooling and Production,* v. 21, Jan. 1956, p. 67-68, 116.

Discussion of accuracy and interchangeability of chromium carbide gage blocks. Calibrated to ±0.0000002. Micrographs. (S14, Cr)

96-S. Method and Apparatus for Measuring the Thickness of Steel Being Rolled, With the Aid of Radioactive Rays. A. M. Bogachev, B. I. Verkhovskii and A. N. Makarov. *Henry Brutcher Translation No.* 3568, 15 p. (From *Zavodskaya laboratoriya,* v. 21, no. 7, 1955, p. 813-820.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 274-S, 1955. (S14, ST)

97-S. Spectrographic Analysis of Carbon and Low-Alloy Steels, Also Steelmaking Pig Irons. N. V. Buyanov. *Henry Brutcher Translation No.* 3624, 7 p. (From *Izvestiya akademii nauk SSSR, Ser. Fiz,* v. 19, no. 2, p. 174-178.) Henry Brutcher, Altadena, Calif.

Results from analysis of steel containing manganese, silicon, chrominum, nickel, aluminum, molybdenum and titanium, and of pig irons with 0.8 to 4.4% manganese, and 0.2 to 1.50% silicon. Table. (S11, CN, CI)

98-S. (Dutch.) **Determination of Oxygen, Hydrogen and Nitrogen in Steel by the Vacuum Fusion Method.** Elly Hoekstra. *Smit mededelingen,* v. 10, no. 4, Oct.-Dec., 1955, p. 158-163.

Includes photographs, diagram, table. 5 ref. (S11, ST)

99-S. (French.) **Determination of Tin in Steelmaking Products.** J. Migeon. *Chimie analytique,* v. 37, no. 12, Dec. 1955, p. 416-421.

Conditions of polarographic determination of tin, an impurity of steelmaking products, in a perchloric acid-sodium chloride mixture after separation of the tin by distillation. Tables, graphs, diagram. 27 ref. (S11, Sn)

100-S. (French.) **Ultrasonic Detection of Penetration in Autogenous T-Welds.** Georges A. Homes. *Revue de la soudure (Brussels),* v. 11, no. 4, 1955, p. 204-213.

Studies of the penetration of ultrasonic waves at oblique and perpendicular incidences to metal surfaces. Photographs, diagrams, oscillograms, tables. (S13, K19)

101-S. (German.) **X-Ray Fluorescence Spectroscopic Analysis and Its Importance in Metallography.** Otto Werner. *Archiv für das Eisenhüttenwesen,* v. 26, no. 12, Dec. 1955, p. 721-737.

Device for producing and measuring X-ray fluorescence radiation, its application in quantitative and qualitative analysis in addition to the measurement of the layer thickness. Graphs, tables, diagrams, photographs. 43 ref. (S11, M23)

102-S. (Russian.) **Fast-Acting Sensitive Pyrometer.** M. G. Kogan. *Vestnik mashinostroeniia,* v. 35, no. 12, Dec. 1955, p. 58-59.

Circuit and operation of a new instrument for more effective measurement of temperatures during induction heating. Photograph, circuit diagram. 9 ref. (S16)

103-S. Improving Casting Quality Through Non-Destructive Testing. Francis H. Hohn. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 446-450.

Equipment and procedures used to obtain information about defects (porosity, shrinkage, cracks, etc.) in steel castings. Diagrams, photographs, radiographs, graphs. (S13, CI)

104-S. Practical Methods for Attaining Constant Sensitivity and Density in Industrial Radiography K. G. Roberts. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 669-674.

A uniform film density, having optimum radiographic sensitivity, may be obtained by varying the kilovoltage with specimen thickness and material density. Exposure time is

then only related to source-to-film distance. Tables, graphs. 9 ref. (S13)

105-S. Non-Destructive Testing—A Valuable Tool for the Foundryman. Hans J. Heine. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 726-727.

Nondestructive inspection of castings and flaws most frequently recognized. Tables. 4 ref. (S13)

106-S. Use of Cobalt 60 for Castings. Jewelle N. Ketchbaw. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 728-729.

Use of cobalt-60 to find information about the internal conditions of a casting. Radiograph, photographs. (S13)

107-S. Increased Foundry Profits Through Non-Destructive Testing. Kermit Skeie. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 730-731.

Includes table, photographs. (S13, E general)

108-S. Radiography—A Nondestructive Test for the Foundry. William D. Kiehle. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 736-740.

Basic radiographical methods for testing castings and benefits realized by the foundryman. Radiographs, diagrams, photographs. (S13, E general)

109-S. The Analysis of Phosphating Preparations Used for the Protection of Steel Surfaces. G. H. Bush, D. G. Higgs and F. W. Box. *Analyst,* v. 80, Dec. 1955, p. 885-896.

Analytical methods for determination of major and minor constituents in solid and liquid manganese and zinc phosphating preparations used for the protection of steel surfaces. Tables. 6 ref. (S11, L14, ST)

110-S. The Significance of *mu* in the Specification of Surface Finish. *Mechanical World and Engineering Record,* v. 136, Jan. 1956, p. 14-16.

Explanation of basic surface finish techniques and differences between European, British and American methods of measurement. Significance of standard symbols designating roughness, waviness and lay. Graphs, diagram. (S15)

111-S. Investigation on the Ultrasonic Testing of Glued Metal Joints. J. Schijve. *Netherlands National Luchtvaart-laboratorium Report,* M. 1995, 1955, 25 p.

Theoretical analysis for ultrasonic and resonance tests performed on glued metal joints, manufactured in such a way that the quality of the bonding was unfavorably influenced by different causes. Diagrams, graphs, photographs, tables. 9 ref. (S13, K12)

112-S. Where Should You Draw the Line? J. B. Caine. *Steel,* v. 138, Jan. 23, 1956, p. 74-76.

Standards for magnetic particle inspection of ferrous metals. Diagrams. (S13, Fe)

113-S. Tracer Fixtures Expand Use of Optical Gaging. *Western Machinery and Steel World,* v. 47, Jan. 1956, p. 95.

Reticule tracing equipment and procedures for accurately gaging parts previously considered too difficult for inspection on contour projectors. Diagrams, photograph. (S14)

114-S. A Design for Non-Sticking Plug and Ring Gages and Locators. Lawrence E. Doyle, Bernard R. Better and Bei Tse Chao. *University of Illinois Bulletin (Engineering Experiment Station Bulletin No.* 433), v. 53, no. 38, Jan. 1956, 28 p.

Formulas have been derived and presented for the proper design of common types of plugs and rings used for gages, fixtures, jigs and other tools. Diagrams, graphs, photographs, table. 4 ref. (S14)

115-S. (Russian.) **A Problem of the Theory of Statistical Methods of Inspection and Control.** N. A. Borodachev. *Leningradskogo, universiteta, vestnik, seriia matematiki, fiziki i khimii,* v. 10, no. 11, Nov. 1955, p. 79-97.

Equations, testing reliability of variants of continuous checking during the manufacturing process, show that the percentage of rejects of defective parts would be decreased. Diagrams, graphs. 4 ref. (S12)

116-S. (Russian.) **Determination of Free and Carbide Carbon in Austenitic Chromium-Nickel Steel.** N. M. Popova and L. V. Zaslavskaia. *Zavodskaia laboratoriia,* v. 21, no. 11, 1955, p. 1285-1288.

Relation between content of free carbon and tempering and quenching temperatures. Use of bromothymol blue as specific reagent to determine concentration of carbon in solid solution. Graphs, table. 3 ref. (S11, SS)

117-S. (Russian.) **Ion-Exchange Methods in Determination of Thallium and Indium in Products From Processing of Nonferrous Metal Ores.** L. B. Ginzburg and E. P. Shkrobot. *Zavodskaia laboratoriia,* v. 21, no. 11, 1955, p. 1289-1294.

Separation of antimony and thallium by absorption from solutions

of varying acidity or alkalinity. Determination of thallium in zinc and lead powders, zinc electrolytes, and metallic cadmium. Determination by fluorescent method. Tables, graphs. (S11, Ti, In)

118-S. (Book.) **Chemical Engineering Instruments and Control Methods.** E. Molloy and E. Carr, Ed. Chemical and Chemical Engineering Series. 182 p. 1954. George Newnes Limited, Tower House, Southampton Street, Strand, W.C.2, London, England.

Types of meters, controllers, and recording instruments which control quantity of a material as well as quality. (S19)

119-S. (Book.) **Standards for a Strong America. Fifth National Conference on Standards and the Thirty-Sixth Annual Meeting of the American Standards Association Proceedings (Annual Volume),** v. 36, 1954, 97 p. American Standards Association, 70 East Forty-fifth St., New York 17, N. Y. $3.00.

Papers on standards for architecture, safety, electricity, surface finishes, agriculture, color television and industry. (S22)

120-S. (Book.) **Temperature. Its Measurement and Control in Science and Industry.** Hugh C. Wolfe, Ed., v. II. 467 p. 1955. Reinhold Publishing Corp., 430 Park Ave., New York, N. Y.

The Third Symposium on Temperature reviews developments in concepts, measurement, and standards of temperature since 1939. (S16)

121-S. (Book—German.) **Handbook for the Metallurgical Laboratory.** v. IV. Selected Methods for Arbitration Analyses and Contradicting Determinations. 168 p. 1955. Verlag Stahleisen M.B.H., Düsseldorf, Germany.

Analytical methods for settling disputes and reconciling different results on samples of the same material. Includes reagents, solvents, titration standards, etc. (S11)

122-S. Ultrasonic Testing of Small-Diameter Tubing With Automatic Recording Equipment. W. L. Fleischmann and H. A. F. Rocha. *ASME, Transactions,* v. 78, Jan. 1956, p. 211-215; disc. p. 215-216.

Delayed shear wave search unit enables ultrasonic testing of small object, while automatic recording eliminates human variables. Photographs, graphs, diagrams. 3 ref. (S13, SS)

123-S. Instruments as Applied to Product Improvement in Steel Plant Furnaces. J. W. Percy. *Industrial Heating,* v. 23, Jan. 1956, p. 87 + 5 pages.

Some applications of instruments for temperature and combustion control. Diagrams. (S16, S19, D general, ST)

124-S. Standards for Die Casting Practice. E. N. Field. *Machinery (London),* v. 87, Dec. 30, 1955, p. 1533-1540.

Design aspects, dimensional tolerances, product standards and effect of die temperature on casting dimensions in accordance with the British Standard Code. Tables, graphs. (S22, E13, Zn)

125-S. Electron Bombardment Furnace Temperature Controller. W. A. Rocco and G. W. Sears. *Review of Scientific Instruments,* v. 27, Jan. 1956, p. 1-2.

Apparatus, control circuit and performance of temperature controller using high-gain servo amplifier system to control bombardment current. Diagrams. (S16)

126-S. Automatic Heat Control Probiems of Gas-Fired Industrial Furnaces Analyzed. L. Lawther, *Steel Processing,* v. 42, Jan. 1956, p. 33-35.

Effect of thermocouple construction and location on measuring time lags and thermal inertia of the furnace. Diagrams, graphs. (S16, J general)

127-S. How to Use Optical Tooling Methods. Earle B. Brown. *Tool Engineer,* v. 36, Feb. 1956, p. 93-98.

Advantages of new technique for accurate measurements are shown by description of its use in constructing an aircraft assembly jig. Photographs, diagrams. (S14)

128-S. Effect of Heat Treating and Mechanical Working of 18-4-1 High-Speed Steel on the Results of Spectro-Analysis. I. A. Grikit. *Henry Brutcher Translation* No. 3617, 4 p. (From *Izvestiya akademii nauk SSSR, seriya fizicheskaya,* v. 19, no. 2, 1955, p. 171-173.) Henry Brutcher, Altadena, Calif.

Differences between chemical analysis and spectroanalysis of cast and forged specimens. Heat treatment has very little influence. Cast specimens have stronger lines for vanadium and tungsten than worked specimens. Table, graphs. (S11, AY)

129-S. Rapid Method for Quantitative Spectro-Analysis of High-Alloy Steels and Alloys. A. G. Komarovskii. *Henry Brutcher Translation No.* 3619, 4 p. (From *Izvestiya akademii nauk SSSR, seriya fizicheskaya,* v. 19, no. 2, 1955, p. 167-169.) Henry Brutcher, Altadena, Calif.

Calibration curves for estimation of elements in complex steels, and

tabulated compositions of several alloys. Table, graph. (S11, AY, SG-h)

130-S. Determination of Impurities in Titanium by Spectro-Analysis. Sh. G. Melamed, M. A Notkina and S. M. Solodovnik. *Henry Brutcher Translation No.* 3620, 4 p. (From *Izvestiya akademii nauk SSSR, seriya fizicheskaya,* v. 19, no. 2, 1955, p. 179-180.) Henry Brutcher, Altadena, Calif.

Three different methods permit determination of phosphorus, silicon, magnesium and calcium. Graph. (S11, Ti)

131-S. (Russian.) **Use of Method of Ion-Exchange Chromatography in Determination of Molybdenum in Steels and Ores.** I. P. Alimarin and A. M. Medvedeva. *Zavodskaia laboratoriia,* v. 21, no. 12, 1955, p. 1416-1418.

Effect of concentration of hydrogen peroxide on sorption of molybdenum in sulfuric acid medium. Graph, tables. 11 ref. (S11, Mo, ST)

132-S. (Russian.) **Ultrasonic Inspection of Size of Graphitic Inclusions in Gray Cast Iron.** N. V. Khimchenko and V. N. Prikhod'ko. *Zavodskaia laboratoriia,* v. 21, no. 12, 1955, p. 1468-1471.

Determination of length of graphite flakes in gray cast iron of pearlite-ferrite type. Table, graphs, micrographs, 1 ref. (S13, M23, CI)

133-S. Separation of Rare Earths From Thorium Nitrate. M. W. Lerner and G. J. Petretic. *Analytical Chemistry,* v. 28, Feb. 1956, p. 227-229.

With 90% recovery, thorium is extracted with dibutoxy tetraethylene glycol, and the residual thorium and other impurities with 8-quinolinol-chloroform. Tables. 13 ref. (S11, EG-g)

134-S. Titrimetric Determination of Zirconium in Magnesium Alloys. Philip J. Elving and Edward C. Olson. *Analytical Chemistry,* v. 28, Feb. 1956, p. 251-252.

Titrimetric determination, using cupferron solution and amperemetric equivalence point detection, provides a rapid, simple and accurate supplement to colorimetric and gravimetric methods. Table. 5 ref. (S11, Zr, Mg)

135-S. Laboratory Tests for Predicting the Behavior of Metals. C. E. Homer. *Birmingham Metallurgical Society, Journal,* v. 35, Dec. 1955, p. 304-321.

Accuracy of small-scale vs. large-scale trials; difficulty of simulating service conditions in the laboratory. Analysis of various laboratory tests to obtain information in corrosion, cracking tendencies, hot and cold workability and other properties. Photographs, graphs. 5 ref. (S21, Q general)

136-S. Caesium—137 for Industrial Radiography. R. S. Morgan. *British Journal of Applied Physics,* v. 7, Jan. 1956, p. 25-28.

Investigates suitability of cesium-137 as a γ-ray emitter for radiography and indicates its usefulness for steel up to 4 in. Graphs, tables. 10 ref. (S13, Cs)

137-S. Classifying Copper and Its Alloys. *Copper & Brass Bulletin,* 1956, no. 176, Feb., p. 8-9.

Table of copper and copper-base metals giving nominal composition in per cent. Table, photograph. (S22, Cu)

138-S. A Non-Destructive Method for the Determination of Uranium-235 in Uranium Metal Slugs. D. G. Miller. *Hanford Atomic Products Operation (U. S. Atomic Energy Commission),* HW-39969, Oct. 1955, 26 p.

Method, using a gamma scintillation spectrometer, based on a determination of the differential counting rate exhibited by the 0.2 m.e.v. photopeak associated with the decay of uranium-235. Graphs, diagrams, photograph. 4 ref. (S11, U)

139-S. Strip-Steel Thickness Control. *Instruments and Automation,* v. 29, Jan. 1956. p. 91.

Description and operation of X-ray gage system for five-stand mill. Photographs. (S14, F23, CN)

140-S. Instrumentation for a Continuous Strip Steel Annealing Line. A. B. Chamberlin, Jr. *Instruments and Automation,* v. 29, Feb. 1956, p. 285-287.

Instrumentation includes temperature control of furnace zones, measurement of strip temperature in the various zones, control of the anneal atmosphere, safety features and fuel control. Photographs. (S16, S19, J23, ST)

141-S. The Steel Industry Has Plans for Multipoint Recorders. J. A. Milnes. *Instruments and Automation,* v.29, Feb. 1956, p. 290-291.

Multipoint recording facilitates interpretation of data and can lead to better production methods. Photographs. (S16, S19, ST)

142-S. Determination of Vanadium in Highly Alloyed Steels. *Iron and Steel Institute Journal,* v. 182, Feb. 1956, p. 156-159.

Standard methods already used for mild steel and ferro-vanadium applied to alloy steels with improvement in endpoint detection. Details

of procedure are given. Tables. 4 ref. (S11, V, AY)

143-S. International Standards for Wrought Light Alloys. *Light Metals,* v. 19, Jan. 1956, p. 22-23.

Tables of light alloy standards of the Canadian Standards Association. Tables. (To be continued.) (S22, EG-a)

144-S. Why Anti-Friction Bearings Fail. Johnny Riddle. *Machinery,* v. 62, Feb. 1956, p. 155-162.

Illustrated examples of common reasons for bearing failures. Photographs. (S21, Q7, Q26)

145-S. New Nondestructive Test for Magnesium Alloy Castings. G. R. VanDuzee. *Materials & Methods,* v. 43, Jan. 1956, p. 98-99.

Bleed-out penetrant method overcomes many of the disadvantages of fluorescent technique. Photographs. (S13, Mg)

146-S. The Determination of Zinc in Copper Alloys. B. Chew and G. Lindley. *Metallurgia,* v. 53, no. 315, Jan. 1956, p. 45-47.

Chromatographic method for the separation of zinc in the 1 to 40% range from all normal types of copper-base alloy. Separated zinc is determined by titration with disodium ethylene diamine tetra-acetate. Tables. 18 ref. (S11, Zn, Cu)

147-S. Determination of Nickel, Chromium, and Molybdenum Using the Spekker Absorptiometer. J. Winning and S. Miller. *Metallurgia,* v. 53, no. 315, Jan. 1956, p. 50-52.

Some advantages of this method for determinations in steel are increased speed, reduced cost, and elimination of heavy fumes. Graphs (S11, Ni, Cr, Mo, AY)

148-S. Recent Accidents With Large Forgings. E. E. Thum. *Metal Progress,* v. 69, Feb. 1956, p. 49-57.

Causes of four failures of massive rotor forgings reveals that two were due to unduly high stress concentrations introduced by the design or by a repair, others were due to misinterpreting or minimizing the evidence of internal defects found by ultrasonic inspection. Photographs, micrographs, diagrams, graphs. (S21, S13, Q25, ST)

149-S. Service Failures of Aluminum Die-Casting Dies. G. A. Roberts and A. H. Grobe. *Metal Progress,* v. 69, Feb. 1956, p. 58-61.

The three most common types of failures of aluminum die-casting dies are heat checking, pitting and impingement soldering. Causes of each are investigated. Photographs, micrographs. (S21, E13, TS)

150-S. How Statistical Techniques Solve Metalworking Problems. I. Chester R. Smith. *Metal Progress,* v. 69, Feb. 1956, p. 81-86.

Both time and money can be saved by using statistical techniques to analyze and minimize the necessary experimental data. Two examples of the techniques illustrate how the best methods of processing titanium were selected with a minimum of expense. Tables. (S12, Ti)

151-S. Determination of Aluminum in Presence of Fluoride, Zirconium, and Uranium. Bernice E. Paige, Maxine C. Elliott and James E. Rein. *Phillips Petroleum Co., Idaho Operations Office U. S. Atomic Energy Commission,* IDO-14357, Nov. 1955, 9 p.

A convenient and reliable method which can be made without sample transfers. Table. 6 ref. (S11, Al)

152-S. Analytical Determination of Trace Constituents in Metal Finishing Effluents. XI. The Determination of Nitrate-Nitrite Nitrogen in Effluents. Earl J. Serfass and Ralph F. Muraca. *Plating,* v. 43, Feb. 1956, p. 233-234.

Procedure involves removal of ammonia from the sample, reduction of the nitrate and nitrite content to ammonia by aluminum, distillation of the ammonia, and determination of the ammonia content of the distillate in the usual manner with Nessler's reagent. Table. (S11, A8)

153-S. Quality Control of Investment Castings. II Charles Yaker. *Precision Metal Molding,* v. 14, Feb. 1956, p. 55-56, 81.

Major phases in setting up production that meets quality control. (S12, E15)

154-S. (French.) **Experimentation on Rolling Stock. Relationship Between Test and Regular Service.** L. Gaspard. *Métaux corrosion-industries,* v. 30, no. 363, Nov. 1955, p. 426-439.

Static, compression, shock and vibration tests made on rolling stock; relationship between results of tests and behavior of equipment in service. Photographs, diagrams. (S21)

155-S. (Russian.) **Determination of Hydrogen in Certain Metals by the Isotopic Balance Method.** A. N. Zaidel' and A. A. Petrov. *Zhurnal tekhnicheskoi fiziki,* v. 25, no. 14, 1955, p. 2571-2573.

Ratios of solubilities for isotopes in metals at high temperatures in gaseous phase; comparison of isotopic with chemical analysis data. Tables. 5 ref. (S11, Zn, Fe, Ni, Cr)

156-S. (Slovak.) Some Methods of Following Heat Transformations in the Zone of Automatic Submerged-Arc Welds. Andrej Havalda. *Zvaranie,* v. 4, no. 8, Aug. 1955, p. 226-231.

Advantages and disadvantages of various methods of measuring temperatures in welds and adjacent zones. Description of method comprising rotating contactor connecting an oscillograph with individual thermocouples. Photographs, diagrams, graphs. (S16, K1)

157-S. Electrical Control for the Processing of Transformer Core Steel. E. F. Boening and John Kostelac. *Blast Furnace and Steel Plant,* v. 44, Feb. 1956, p. 199-207.

Detailed description of control features at every step in the processing lines. Photographs, diagrams. (S18, F23, SG-p)

158-S. Investigations Into the Accuracy of Ball-Bearing Components. A. Kohaut. *Engineers' Digest,* v. 17, Jan. 1956, p. 9-11. (From *Werkstattstechnik und Maschinenbau,* v. 45, no. 10, Oct. 1955, p. 510-513.)

An interference microscope was used for accurate surface investigation of balls. Defects due to shape, assembly and corrosion. Photographs, micrographs. (S15, R1)

159-S. Titanium, Analysis of Impurities. Sam Tour and Henry Suss. *Light Metal Age,* v. 14, Feb. 1956, p. 16-20.

The wet chemical and chlorimetric methods of analyzing titanium for various elements. Photographs. 11 ref. (S11, Ti)

160-S. What Non-Destructive Testing Can Do for You. *Modern Castings,* v. 29, Feb. 1956, p. 35-37.

Nondestructive inspection of castings, properties measured by nondestructive tests, flow recognized through nondestructive testing. Tables. 4 ref. (S13)

161-S. Comparator Specimens Assure Good Finishes. John W. Sawyer. *Steel,* v. 138, Feb. 20, 1956, p. 112-113.

Roughness-comparator specimens for surface finishes of machined parts are proving valuable in production. Manufacturers are listed and their products described. Photographs. (S15)

162-S. Temperature Control of Heat Treating Furnaces. I-II. R. M. Sills. *Steel,* v. 138, Feb. 13, 1956, p. 108-110, 112; Feb. 20, 1956, p. 135-136, 138-139.

Importance of automatic regulation of work temperature is emphasized, and various types of measuring devices are discussed. Data on thermocouples includes composition, characteristics, location, accuracy and temperature range. Graphs, tables, photographs, diagrams.
(S16, J general)

163-S. Rapid Test for Checking Pickling Rinse Waters. Isidore Geld. *Wire and Wire Products,* v. 31, Feb. 1956, p. 200, 236.

O-phenathroline ferrous complex indicator and ceric sulfate solution in normal ferric acid are used in quick and simple test for excessive impurities. 1 ref.
(S11, L12, ST, Fe)

164-S. (German.) Carbon in Non-Ferrous Metals. II. Carbon in Aluminum. Joseph Fischer and Walter Schmidt. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 9, no. 1, Jan. 1956, p. 25-28.

Determination of carbon by combustion method in wet oxygen flow at 1050 to 1100° C., with addition of equal weight of copper and 1/10 of its weight of lead and tin. Graphs. 9 ref. (S11, Al)

165-S. Profile-Inspection. *Aircraft Production,* v. 18, Mar. 1956, p. 112-115.

The Probograph, a special electrical-electronic instrument designed for inspection of aerofoil profiles of gas turbine blades is based upon the principle of measuring the workpiece at points dimensioned on the part-drawing. Photographs, diagrams. (S14)

166-S. How to Get More Range From an Air Gage. L. E. Abbott and A. F. Pomeroy. *American Machinist,* v. 100, Feb. 27, 1956, p. 113-115.

Equipment and methods for measuring diameter of round copper wave-guide pipe for transmission lines. Diagrams, photographs.
(S14, Cu)

167-S. Measuring Gear Tooth Wear. George Uberti. *American Society of Naval Engineers, Journal,* v. 68, Feb. 1956, p. 151-153.

Extensive tests of both conventional and advanced types of ship main reduction gears are conducted at the U. S. Naval Boiler and Turbine Laboratory. Each step in testing followed by thorough examination of pertinent gear parts. Graphs, diagrams, photograph. (S14, Q9)

168-S. Electrical Inspection of Steel Pipe Coatings. S. Mark Davidson. *American Water Works Association, Journal,* v. 48, Feb. 1956, p. 121-130.

Electrical inspection of coatings confined to specified coal tar-enamel coatings. Photographs, table. 5 ref. (S13, L26, ST)

169-S. Analysis of Samples Containing Uranium, Niobium, and Zirconium. Philip J. Elving and Edward C. Olson. *Analytical Chemistry,* v. 28, Mar. 1956, p. 338-342.

Importance of reasonably rapid, simple and accurate methods for analysis of mixtures containing uranium, niobium and zirconium prompted an investigation of polarographic and amperometric procedures for this purpose. Tables, graphs. 20 ref. (S11, U, Cb, Zr)

170-S. Determination of Hydrogen in Titanium Metal by Hot Extraction. R. K. Young and D. W. Cleaves. *Analytical Chemistry,* v. 28, Mar. 1956, p. 372-374.

Data bearing on the precision and accuracy of the hot extraction method accumulated by miscellaneous tests on variety of titanium samples, sponge, sheet, ingot drillings and solid pieces. Graph, table, diagrams. 11 ref. (S11, Ti)

171-S. Photometric Determination of Boron in Titanium and Its Alloys. R. C. Calkins and V. A. Stenger. *Analytical Chemistry,* v. 28, Mar. 1956, p. 399-402.

The carminic acid method incorporates the precision of a photometric method into the determination of small amounts of boron but requires complete elimination of the titanium. Conditions have been found under which this may be done by cation exchange removal of the peroxy-titanium (IV) complex. Graph, tables, diagram. 7 ref. (S11, Ti, B)

172-S. Polarographic Determination of Cobalt in Presence of Nickel. Louis Meites. *Analytical Chemistry,* v. 28, Mar. 1956, p. 404-406.

Determination involves oxidation of cobalt (II) in an ammoniacal ammonium chloride solution of the sample to the + 3 state with excess permanganate, followed by destruction of the latter with excess hydroxylammonium sulfate. Tables, graph. 8 ref. (S11, Zn, Ni, Co)

173-S. Ultraviolet Spectrophotometric Determination of Zirconium. Richard B. Hahn and Leon Weber. *Analytical Chemistry,* v. 28, Mar. 1956, p. 414-415.

Zirconium tetramandelate dissolves in aqueous ammonia, forming a soluble, saltlike compound that exhibits maximum absorbance at a wave length of 258 mμ. This is used as the basis of a spectrophotometric method for the determination of milligram amounts of zirconium in the presence of aluminum, iron and titanium. Graph, table. 2 ref. (S11, Zr, Al, Fe, Ti)

174-S. Application Trends: Control in the Steel Industry. I. A. S. Urano. *Automatic Control,* v. 4, Feb. 1956, p. 13-15.

Applications of control techniques in individual steelmaking, rolling and processing systems, and in combinations of systems where feasible. Photograph, diagrams. (To be continued.) (S18, F23, D5, ST)

175-S. Continuous Gaging in Steel Mills Produces Profit. A. S. Urano. *Automation,* v. 3, Mar. 1956, p. 52-57.

Automation developments in X-ray and width gages for hot strip mills, and automatic gage control for cold rolled strip. Diagrams, photographs, graphs. (S14, F23, ST)

176-S. Ultrasonic Gauging of Hollow Propellers. *Communications and Electronics,* v. 3, Mar. 1956, p. 127-129.

Equipment and method used for checking dimensions of cores for aircraft propellers and for checking the propellers during fabrication. Photographs, diagrams. (S14)

177-S. Plating Thickness by the Attenuation of Characteristic X-Rays. Paul D. Zemany and Herman A. Liebhafsky. *Electrochemical Society, Journal,* v. 103, Mar. 1956, p. 157-159.

Attenuation by iron foil or a characteristic line from either silver or zirconium as substrate was measured in a spectrograph provided with a good collimator and with an analyzing crystal. Results, when corrected for background, show the exponential absorption law is followed closely. Graph, tables. 11 ref. (S14, L17, Ag, Zr)

178-S. Sampling Iron for Carbon Determination. William B. Sobers. *Foundry,* v. 84, Feb. 1956, p. 87-91.

Correct sampling methods are important in providing uniform representative specimens for analytical determination. Photographs, tables, micrographs. 2 ref. (S11, Fe)

179-S. Get Better Grinds With New Control Unit. L. J. Torn. *Iron Age,* v. 177, Mar. 15, 1956, p. 87-89.

A new electronic control unit can be fitted on your present automatic grinder in a matter of a few hours; built for precision, its circuitry is designed to insure a maximum of repeat accuracy. Diagram, photographs. (S14, G18)

180-S. Use of the Spectrograph in Fabrication Shops. Howard E. Boyer and Frank E. Fitzgerald. *Iron and Steel,* v. 29, Feb. 1956, p. 65-69.

The principles and operation of the spectrograph in a metal fabricating shop; limitations and advan-

tages of the apparatus. Diagrams, ultraviolet spectra, photographs, table. (To be continued.) (S11)

181-S. Control Systems Using Non-Contacting Thickness Gages. W. E. Van Horne. *Iron and Steel Engineer,* v. 33, Feb. 1956, p. 96-100; disc., p. 100.

Use of noncontacting gages and accessory equipment for continuously and automatically measuring, controlling, monitoring, recording and classifying in the production of cold rolled strip, hot rolled strip, continuous galvanized strip and electrolytic tinplate. Graphs. (S14, F23, ST, Sn)

182-S. How to Calibrate Your Gage-Blocks. Frederick O. Hutchinson. *Machinery,* v. 62, Mar. 1956, p. 160-166.

Precision gage-blocks can be accurately calibrated in your own plant with a few pieces of simple equipment and careful attention to prescribed rules. Photographs. (S14, ST)

183-S. Precision to a Fraction of a Light Wave. M. S. Hoskins. *Machinery,* v. 62, Mar. 1956, p. 190-193.

Interferometer and its use in evaluating gage blocks for flatness and parallelism as well as for size. Photograph, diagrams. (S14)

184-S. How Statistical Techniques Solve Metalworking Problems. II. Chester R. Smith. *Metal Progress,* v. 69, Mar. 1956, p. 76-78.

Preplanning and statistical design of experiments can result in considerable savings. Example is given of a designed experiment that required less than half the time and material of a conventional investigation. Diagrams, table. (S12, Ti)

185-S. Nondestructive Testing in Construction of the Aircraft Carrier Saratoga. John L. Cahill. *Nondestructive Testing,* v. 14, Jan.-Feb. 1956, p. 16-18.

Procedures followed in radiographing in the field all the structural and pipe welds. Applications of magnetic particle inspection, the oil-penetrant method, ultrasonic inspection and a portable spectroscope. Photographs. (S13)

186-S. Inspecting and Testing Lead Linings. Kempton H. Roll. *Nondestructive Testing,* v. 14, Jan.-Feb. 1956, p. 20-24.

Methods of testing and inspecting sheet-lead linings and bonded or lead-clad linings used in chemical-process industries. Includes penetrants, acid washes, ultrasonics and radiography. Photograph, diagrams, radiograph. (S13, Pb)

187-S. Improvements in High-Sensitivity Fluoroscopic Technique. E. L. Criscuolo and D. Polansky. *Nondestructive Testing,* v. 14, Jan.-Feb. 1956, p. 30-31, 40.

Performance of a high-sensitivity fluoroscope with a new high-power X-ray tube. Fluoroscopic technique and sensitivity curves. Tables, graphs, fluorograph. 5 ref. (S13)

188-S. Radiography in the Testing of Marine Equipment. W. L. Schwinn and G. R. Forrer. *Nondestructive Testing,* v. 14, Jan.-Feb. 1956, p. 32-35.

Radiography and its application in the inspection of weldments and castings. Procedures, technique and equipment. Graph, tables, diagrams, photograph, radiographs. (S13)

189-S. Modern Fluoroscopic Practices. W. R. Hampe. *Nondestructive Testing,* v. 14, Jan.-Feb. 1956, p. 36-40.

Development of industrial fluoroscopy. Five measurements for optimum sensitivity and three basic fluoroscopic arrangements. Discussion of fluoroscopic cabinet and electronic image amplifier. Table, graph, diagrams, photographs. 10 ref. (S13)

190-S. High-Speed Radiation Pyrometer. J. Vollmer, J. Duke and C. Wysocki. *Optical Society of America, Journal,* v. 46, March, 1956, p. 215-217.

A high-speed option for a time-tested radiation pyrometer has been made available. The response time for 98% response is less than or equal to 0.5 sec. It is compensated for ambient temperature effects, is transient free and makes use of existing charts and scales when used with null-balance electronic potentiometers. Diagram, graphs. 1 ref. (S16)

191-S. Aligning Large Machines With Optical Tooling. Harold H. Poett. *Tool Engineer,* v. 36, Mar. 1956, p. 100-103.

Applications and methods used for leveling, aligning and squaring spar mills, planers, and skin mills used in making aircraft parts. Diagrams, photograph. (S14)

192-S. German Alloy Steels. H. L. Waltl. *Automobile Engineer,* v. 46, Feb. 1956, p. 55-58.

Some notes on present practice to conserve scarce materials. Tables. 15 ref. (S22, AY)

193-S. The Utilization of Sonic Principles for Application to an Automatic Method of Casting Inspection. Milton J. Diamond. *Engineering Journal,* v. 3, Mar.-Apr. 1956, p. 38-42.

A completely automatic method

of high production casting inspection is based on the application of electronic instrumentation to the theory that defective castings have different frequency of vibration from that of good castings. Photographs, diagrams (S12)

194-S. Physical Aspects of Absorptiometric Analysis. *Iron and Steel Institute, Special Report No.* 55, Jan. 1956, 37 p. + 4 plates.

Practical problems in the spectral analysis of colored solutions. Tables, graphs, diagrams, ultraviolet spectra. 20 ref. (S11)

195-S. Industry Learns From a Turbine Spindle Failure. R. G. Matters, R. E. Lochen, J. A. Dedinas and H. K. Ihrig. *Journal of Metals,* v. 8, Mar. 1956, p. 317-324.

Investigation of turbine failure revealed thermal cracks and flakes in radial planes near forging center as cause of rupture, and lack of hydrogen diffusion is believed to be basic factor in crack formation. Diagrams, photographs, graphs, micrographs, tables. (S21, Q26, ST)

196-S. An X-Ray Method for Studying Radiation Damage in Graphite. D. R. Chipman and B. E. Warren. *Knolls Atomic Power Laboratory and Massachusetts Institute of Technology, (U. S. Atomic Energy Commission),* KAPL-677, Feb. 1952, 28 p.

Using several orders of the (002) reflection, the complex Fourier coefficients are obtained from which a function is synthesized giving the distribution of changes in distances perpendicular to the graphite layers. Graphs, tables. 3 ref. (S19)

197-S. Portable Ultrasonic Unit Checks 1600 Ft. of Scroll-Case Weld. *Power,* v. 100, Mar. 1956, p. 96-97.

Application of transverse-wave method of ultrasonic scanning to checking welded seams in the scroll case of a 34,500-hp., 80-ft. head turbine, using portable equipment. Photographs, diagram. (S13)

198-S. Quality Control of Investment Castings. III. Charles Yaker. *Precision Metal Molding,* v. 14, Mar. 1956, p. 36 + 5 pages.

Process variables, their effect on quality, how they may be controlled. Table, graphs. (S12, E15)

199-S. The Evaluation of Some Related Heterocyclic Compounds as Analytical Reagents for Metals. Joseph Lawrence Walter. *University of Pittsburgh (U. S. Atomic Energy Commission),* NYO-6506, Sept. 1955, 142 p.

Thirteen compounds were prepared and their analytical aspects studied. Several were found to be highly selective and sensitive as organic analytical reagents. Graphs, diagram, tables. (S11)

200-S. Progress in Ultrasonic Examination. I. Automatic Immersed Scanning. C. W. J. Vernon. *Welding and Metal Fabrication,* v. 24, Mar. 1956, p. 93-97.

Use of this apparatus at Douglas Aircraft Co., Inc., and its counterpart by Kelvin & Hughes (Industrial) Ltd. Diagrams, photographs. (S13)

201-S. (English.) **Study on Carbides in Iron and Steel by Electrolytic Isolation Method. Isolation of Cementite From Carbon Steel.** Tomo-o Sato and Taiji Nishizawa. *Technology Reports, Tohoku University,* v. 20, no. 1, 1955, p. 121-130.

Hydrochloric acid procedure, and the suitable electrolytic conditions of the isolation of cementite from carbon steel. Evaluation of procedure using a hydrochloric acid cell; determination of suitable electrolytic conditions for cementite isolation. Diagram, graphs, table, photographs. 4 ref. (S11, M27, N8, CN)

202-S. (English.) **Increase of Precision in Spectrochemical Analysis of Steels Using Electronically Controlled High-Voltage Spark Source.** A. Bardocz and F. Varsanyi. *Acta Technica Academiae Scientiarum Hungaricae,* v. 13, nos. 3-4, 1955, p. 409-420.

Two such spark sources and one controlled by a rotary synchronous switch are compared, relative to the reproducibility of the analysis procedure. Graphs, diagrams, tables. 11 ref. (S11, ST)

203-S. (French.) **Radiation Pyrometers for Measuring Temperatures in a Transitory Regime.** René Chion. *Metaux, Corrosion-Industries,* v. 31, no. 365, Jan. 1956, p. 22-37.

Classical methods of pyrometry by radiation measurements and principal types of receivers useful, apparatus for pyrometry by sensitometry, and pyrometry apparatus using photosensitive elements. Diagrams, graphs, photographs. 10 ref. (S16)

204-S. (French.) **The Measure of Hydrogen Content in Steels. Analysis of Gases From Specimens Heated *in Vacuo* at Temperatures From 500 to 1100° C. (932 to 2012° F.).** J. Marot. *Revue de metallurgie,* v. 52, no. 12, Dec. 1955, p. 943-960; disc., p. 960.

From this study, which was intended for a definition of the best temperatures for gas extraction, it appears that the 900° C. (1652° F.) range is the best one for gas micro-

analysis. Diagrams, graphs, photograph, tables. 29 ref. (S11, ST)

205-S. (German.) **Investigation of Thermo-Elements of the Iridium-Rhenium System.** G. Haase and G. Schneider. *Zeitschrift für Physik,* v. 144, nos. 1-3, 1956, p. 256-262.

Measurement of thermovoltage at temperatures up to 2450° C. The optimal thermocouple constitution is one with 70 wt.% of rhenium. Graphs, diffractograms. 4 ref. (S16, SG-a, Ir, Re)

206-S. (Polish.) **Possibility of Using the Akimov Apparatus for Sorting Steels.** Stanislaw Gorczyca and Juliusz Maydell. *Hutnik,* v. 22, no. 10, Oct. 1955, p. 362-368.

Apparatus works on principle that the magnitude of thermoelectric force depends on the chemical composition of the elements of a thermocouple. Relation of thermoelectric force to heat treatment of steel, to machined surface, and to content of elements present. Photograph, graphs, diagrams, tables. 8 ref. (S10, ST)

207-S. (Polish.) **Present State of the Development of the State Standards for Cast-Steel and Cast-Iron Castings.** Stanislaw Kobylinski. *Przeglad Odlewnictwa,* v. 6, no. 1, Jan. 1956, p. 22-24.

Standards for the casting industry include specifications for the raw-material charges, technical conditions, classification of materials for castings, and mold technology. Tables. 6 ref. (S22, CI)

208-S. (Russian.) **Strip Thickness Inspection Methods During Cold Rolling.** A. A. Druzhkov and A. U. Bodskii. *Stal',* v. 16, no. 1, Jan. 1956, p. 32-36.

Apparatus for measuring and regulating thickness in high-speed rolling operations. Photographs, diagrams. (S14, F23, ST)

209-S. (Spanish.) **Method of Spectrochemical Determination of Steels. Elimination of the Influence of Other Elements.** Hilaria Carrancio de la Plaza and Antonio Camunas Pluig. *Instituto del hierro y del acero,* v. 8, no. 41, Oct.-Dec. 1955, p. 755-763, disc., 763-764.

Proposed method of spectrochemical analysis of different metallic alloying elements of steels based on measuring the intensities of the spectral lines of the same element. Graphs, tables, photograph. 3 ref. (S11, ST)

210-S. (Spanish.) **Some Applications of Ultrasonic Testing Methods to Large Forged Pieces.** Antonio de Urioste Haya. *Instituto del hierro y del acero,* v. 8, no. 41, Oct.-Dec. 1955, p. 765-781.

Basic theories of ultrasonic frequencies, transmission and reflection methods of testing large forged pieces and their advantages. Diagrams, table, oscillograms, photograph. 25 ref. (S13)

211-S. The Applications of Polarography to the Analysis of Electroplating Solutions. Rafael Diaz. *American Electroplaters' Society, Proceedings,* v. 42, 1955, p. 15-16.

Literature of polarography related directly to the analysis of electroplating solutions for major and minor constituents is reviewed. 21 ref. (S11, L17)

212-S. Simultaneous Polarographic Determination of Cadmium and Zinc in Alkaline Cyanide Solutions. T. A. Downey. *American Electroplaters' Society, Proceedings,* v. 42, 1955, p. 70-73.

Results obtained by this method are not influenced by the common impurities found in alkaline cyanide cadmium and zinc plating baths, and, since it does not involve initial precipitation of the cadmium or zinc, it takes less time per determination. Graphs, tables. 4 ref. (S11, L17, Cd, Zn)

213-S. Analytical Determination of Trace Constituents in Metal Finishing Effluents. VI. The Colorimetric Determination of Chromium in Effluents. VII. The Colorimetric Determination of Manganese in Effluents. VIII. The Colorimetric Determination of Ammonia in Effluents. IX. The Determination of Free Chlorine in Effluents. Earl J. Serfass, Ralph F. Muraca and Donald G. Gardner. *American Electroplaters' Society, Proceedings,* v. 42, 1955, p. 1-2; p. 207-218.

Procedures for the determination of the hexavalent and total chromium, manganese, ammonia and chlorine content of effluents in the range of 5 to 50 p.p.m. Tables. 12 ref. (S11, L17, Cr, Mn)

214-S. Modern Rapid Methods of Chemical Analysis for Quality Control. Hubert C. Swett. *American Iron and Steel Institute, Preprint,* 1955, 11 p.

Description and comparison of spectrographic, magnetic, combustion and volumetric methods and the types of plants and laboratories in which they are used. (S11, ST)

215-S. Film Thickness by X-Ray Emission Spectrography. H. A. Liebhafsky and P. D. Zemany. *Analytical Chemistry,* v. 28, Apr. 1956, pt. 1, p. 455-459.

A method for measuring film thicknesses and for applying these measurements where more than one

film is present. Graphs, table, diagram. 11 ref. (S14)

216-S. Study of the Iodide Titration for Determination of Palladium. Richard N. Rhoda and Ralph H. Atkinson. *Analytical Chemistry,* v. 28, Apr. 1956, pt. 1, p. 535-537.

A volumetric method for the determination of palladium in palladium-rich alloys based on the precipitation of palladous iodide, using the precipitate as its own indicator. Table. 11 ref. (S11, Pd)

217-S. Polarographic Determination of Traces of Bismuth, Iron, Lead, Antimony, Nickel, Cobalt and Manganese in Refined Copper. A. J. Eve and E. T. Verdier. *Analytical Chemistry,* v. 28, Apr. 1956, pt. 1, p. 537-538.

A procedure for the determination of some impurities in refined copper. 9 ref. (S11, Cu)

218-S. Determination of Aluminum in Chromic-Phosphoric Acid Solutions. C. Groot, R. M. Peekema and V. H. Troutner. *Hanford Atomic Products Operation (U. S. Atomic Energy Commission)* HW-40497, Jan. 1956, 29 p.

Colorimetric analysis is used. Diagram, tables, graphs. 15 ref. (S11, Al)

219-S. Gamma Radiography of Metal Castings at Sandia Laboratory. Louise D. Patterson. *U. S. Atomic Energy Commission,* TID-8004, Jan. 1956, 4 p.

Advantages of a relatively portable, inexpensive cobalt-60 gamma source for high-penetration radiography of materials. Photographs. (S13)

220-S. (English.) **On the *K* Spectrum of Aluminium and Its Oxide.** Bertil Nordfors. *Arkiv för Fysik,* v. 10, no. 3, 1956, p. 279-289.

In the *K* spectrum of aluminium the lines $\alpha 2$, $\alpha 1$, $\alpha 3$, $\alpha 4$ and β have been recorded and measured with a double target X-ray tube. Tables, graph, diagrams. 21 ref. (S11, Al)

221-S. (English.) **Investigation of a Pelton Wheel With the 31-MeV Betatron.** *Brown Boveri Review,* v. 42, Nov.-Dec. 1955, p. 478-480.

Sections up to 380 mm. thick examined. Photograph. (S13, ST)

222-S. (German.) **Determination of Rare Earths in Steel.** Heinz Krapp. *Archiv für das Eisenhüttenwesen,* v. 27, no. 2, Feb. 1956, p. 103-105.

Fluoride, peroxide and altered methods, separate determination of rare earths, application to alloy steels, separation of trivalent from four-valent elements. Table. 6 ref. (S11, ST, EG-g)

223-S. (German.) **Supersonic Visual Device and Its Application in Nondestructive Testing.** Herbert Trommler. *Archiv für das Eisenhüttenwesen,* v. 27, no. 2, Feb. 1956, p. 135-142.

Description and capacity. Diagram, photographs. 4 ref. (S13)

224-S. (Japanese.) **On Determination of Nonmetallic Inclusions in Chromium Steel by Hot H_2SO_4 Method.** Shizuya Maekawa and Miyoshige Ebihara. *Iron & Steel Institute of Japan, Journal,* v. 42, no. 2, Feb. 1956, p. 121-126.

Effect of heat treatment factors on reproducibility of determinations of chromic oxide and other inclusions. Graph, diagrams, tables. (S11, M27, SS, AY)

225-S. (Polish.) **Spectrographic Quantitative Analysis of Tin Bronzes.** *Przeglad Odlewnictwa,* v. 6, no. 2, Feb. 1956, p. 45-49.

Types of electrodes and apparatus for spectral analysis. Accuracy and advantages of this method. Determination of tin, zinc, iron, antimony, aluminum, lead and nickel. Photometric techniques. Graphs, tables, spectrogram. 6 ref. (S11, Cu)

226-S. (Russian.) **Detection of Inner Defects in Large Forged Items by Means of Ultrasonics.** F. M. Mikhailov. *Vestnik Mashinostroeniia,* v. 36, no. 2, Feb. 1956, p. 60-64.

Detection and determination of cause of cracks in forged shaft 800 mm. in diam. and 3.5 m. long. Graphs, diagrams, photographs, sonograms. (S13)

227-S. (Russian.) **Investigation of the Scattering of Ultrasonics in Metals.** L. G. Merkulov. *Zhurnal Tekhnicheskoi Fiziki,* v. 26, no. 1, Jan. 1956, p. 64-75.

Equipment, equations and measuring methods. Longitudinal and transverse waves in magnesium, iron and copper. Comparison of experimental and theoretical results. Tables, diagrams, graphs. 9 ref. (S13, Fe, Mg, Cu)

228-S. (Book.) **Temperature Measurement.** W. E. Belcher, Jr., Donald Robertson, and W. F. Hickes. 75 p. 1956. American Society for Metals, Cleveland, Ohio. $1.00.

Includes industrial temperature measurement with thermocouple pyrometers; total radiation and the optical pyrometers; and filled system and resistance thermometers. Diagrams, photographs, tables. (S16)

229-S. (Book.) **ASTM Standards on Copper and Copper Alloys.** 642 p. Dec. 1955. American Society for Testing Materials, 1916 Race Street, Philadelphia 3, Pa. $5.75.

Standard and tentative methods of testing, and specifications pertaining to copper and copper-base alloy products. (S22, Cu)

230-S. (Book.) Advanced Analytical Chemistry. Walter Wagner, Clarence J. Hull, and Gerald E. Markle. 282 p. 1956. Reinhold Publishing Corp., 430 Park Ave., New York 22, N. Y.

Theory, instrumentation and analytical chemistry of the elements. (S11)

231-S. A Rapid Chemical Method for the Determination of Lithium in Lithium-Aluminum Alloys. D. H. Purcell and G. B. O'Conner. *Argonne National Laboratory (U. S. Atomic Energy Commission),* ANL-4911, Apr. 1952, 10 p.

Volumetric method is based on the isolation of lithium by precipitation with potassium ferric periodate and an iodometric titration of the ferric iron and periodic acid liberated when the precipitate is dissolved in acid. Tables. 6 ref. (S11, Li, Al)

232-S. Radiographic Procedures for PWR-Type Fuel Elements. David E. Stutz, Merle L. Rhoten, Kenneth D. Cooley and Samuel A. Wenk. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* BMI-1016, July 1955, 25 p.

Development work on techniques for radiographic inspection of the core, end cap and the cladding. Graphs, micrographs, diagrams, radiographs. (S13, Mo, U, Zr)

233-S. Automatic Control in the Steel Industry. R. W. Holman. *Blast Furnace and Steel Plant,* v. 44, Apr. 1956, p. 391-397.

Basic concepts of automation, automation in cold reduction mills, process and precipitator controls, continuous processing lines, control system types, telemetering and supervisory control. Diagrams, photographs. (S18)

234-S. Gamma Radiation From the Proton Bombardment of Boron Ten. G. B. Chadwick, T. K. Alexander and J. B. Warren. *Canadian Journal of Physics,* v. 34, Apr. 1956, p. 381-388.

Gamma rays resulting from the bombardment of B^{10} with protons of energies from 0.5 to 2.0 Mev. were observed with a sodium iodide scintillation counter. Results substantiate the findings of other investigations. Graphs. 10 ref. (S19)

235-S. The Spectrochemical Assay of Uranium-235 Using Photomultiplier Tubes. T. Lee and Lewis H. Rogers. *Carbide and Carbon Chemicals Company, K-25 Plant (U. S. Atomic Energy Commission),* K-835, Oct. 1951, 28 p.

Methods and equipment. Diagrams, photographs, tables, ultraviolet spectra. 12 ref. (S11, U)

236-S. An Economic Evaluation of the Silica Gel Adsorption Process for the Separation of Hafnium From Zirconium. W. R. Millard and R. H. Maitland. *Iowa State College, Ames Laboratory (U. S. Atomic Energy Commission),* ISC-268, Aug. 1952, 11 p.

Cost of silica gel reclamation, current status, costs, and possible cost reductions in adsorption process. 7 ref. (S11, Zr, Hf)

237-S. The Use of the High Current Mercury Cathode in Uranium Determination. J. Gurney, T. W. Bartlett, E. D. Marshall and R. H. Lafferty, Jr. *Carbide and Carbon Chemicals Company, K-25 Plant (U. S. Atomic Energy Commission),* K-1106, Feb. 1954, 28 p.

Electrolysis with a mercury cathode operating at 20 amp. was tested as a method for rapid purification of uranium solution prior to volumetric determination. Graphs, diagrams. 19 ref. (S11, U)

238-S. A Study of the Separation of Hafnium and Zirconium Using TTA. Dorothy C. McCarty, Burton E. Dearing and John F. Flagg. *Knolls Atomic Power Laboratory (U. S. Atomic Energy Commission),* KAPL-180, Apr. 1949, 45 p.

Extraction in a nitric acid system studied as a function of acidity and thenoyltrifluoroacetone concentration. Tables, diagram, graphs. (S11, Hf, Zr)

239-S. The Determination of Vanadium in the Presence of Plutonium. Maynard E. Smith. *Los Alamos Scientific Laboratory (U. S. Atomic Energy Commission),* LA-1285, Aug, 1, 1951, 26 p.

Polarographic method does not require a separation of the plutonium. Hydrochloric acid solutions containing both plutonium and vanadium are treated with zinc and zinc amalgam prior to analysis to reduce both metals. The plutonium is reduced to the (III) state and the vanadium chiefly to the (II) state. Diagram, graphs, photographs, tables. 6 ref. (S11, Pu, V)

240-S. The Spectrophotometric Determination of Thorium in Uranium. Maynard E. Smith. *Los Alamos Scientific Laboratory (U. S. Atomic Energy Commission),* LA-1897, Apr. 1955, 16 p.

Method involves separation of the uranium from the thorium by complexing the thorium with Versene and precipitating the uranium as the peroxide. Graph, tables. 10 ref. (S11, Th, U)

241-S. British Standards for Aluminium and Alloys—1955 Revisions. E. Elliott. *Metallurgia,* v. 53, no. 317, Mar. 1956, p. 108-112.

Summarizes major changes in revisions of B.S. 1470-1477 and B.S. 1490. Tables. 4 ref. (To be concluded.) (S22, Al)

242-S. New Thermocouple for Service in Reducing Atmospheres. Charles L. Guettel. *Metal Progress,* v. 69, Apr. 1956, p. 89-90.

Two new thermocouple alloys are more resistant to the corrosive attack of reducing gas and retain thermal e.m.f. stability longer than conventional base-metal thermocouples. Graph. (S16, SG-a)

243-S. Development of Radiation Pyrometry Techniques for Measurement of Temperature During the Rolling of Uranium. C. W. Ricker, H. F. Schaf and J. V. Werme. *Minneapolis-Honeywell Regulator Company, Brown Instruments Division (U. S. Atomic Energy Commission),* NYO-3454, May 1953, 74 p.

Laboratory facilities, radiomatic radiation detector, emittance of uranium as rolled and emissivity of the metal; calibration procedures. Tables, photographs, graphs. 4 ref. (S16, F23, U)

244-S. Mathematical Foundations of Non-Destructive Testing by Eddy Current Methods. Richard Hochschild. *New York Operations Office (U. S. Atomic Energy Commission),* NYO-3576, Mar. 1953, 84 p.

Electromagnetic field equations, field distribution, impedance and eddy currents in a solid homogeneous cylindrical conductor, nonuniform permeability and multiple component cylinders, some eddy current tests and their analyses. Diagrams, tables, graphs. (S13)

245-S. Summary of Stable Isotope Production and Chemistry Procedures. H. W. Savage and Boyd Weaver. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission),* Y-565, Feb. 1950, 29 p.

Information showing charge materials used, primary calutron problems, practicability of calutron isotope separation, collector pocket material, methods for chemical refinement of the product. Tables. (S19)

246-S. Analytical Determination of Trace Constituents in Metal Finishing Effluents. XIII. The Volumetric Determination of Sulfate in Effluents. E. J. Serfass and R. F. Muraca. *Plating,* v. 43, Apr. 1956, p. 500-501.

Volumetric procedure for determination of sulfate in effluents in the range of 5 to 50 ppm.; method makes use of a combination of hydroxide and silver ion precipitations to remove ions which might interfere with the indicator for the titration. (S11, L general)

247-S. Use of Ion Exchange for the Separation of Uranium From Ions Interfering in Its Colorimetric Determination. Sallie Fisher. *Rohm and Hass Company, Research Laboratories (U. S. Atomic Energy Commission),* RMO-2530, May 1954, 32 p.

In sulfate solutions uranium is absorbed on an anion exchange resin and eluted with perchloric acid. Interfering metals are pre-reduced to forms not retained by the resin. Tables, photograph. (S11, U)

248-S. Application of the Ion Exchange Separation of Uranium to the Analysis of Ores. Sallie A. Fisher. *Rohm and Haas Co., Research Laboratories (U. S. Atomic Energy Commission),* RMO-2531, Aug. 1954, 14 p.

Analytical separation of uranium from interfering elements by ion exchange using Amberlite IRA-400 has been extended to include ores as well as solutions. Tables. (S11, U)

249-S. A Spectrophotometric Method for Determining Small Amounts of Beryllium in Uranium. Maynard E. Smith. *U. S. Atomic Energy Commission, Research and Development Report,* LA-1585, Aug. 1953, 26 p.

Method is based on extraction of beryllium acetylacetone complex from uranium carbonate solutions. Photograph, graphs, tables. 12 ref. (S11, U, Be)

250-S. The Possible Use of Paper Chromatography and Radioactive Reagents in Ultramicro Inorganic Analysis, With Special Reference to Uranium and Plutonium. Robert M. Fink and Kathryn F. Fink. *University of California, Atomic Energy Project (U. S. Atomic Energy Commission),* UCLA-30, June 1949, 26 p.

The best reagent would be one which was relatively insoluble in organic reagents (low R.F. value) but which would yield stable compounds of relatively high R.F. values with the substances under investigation. Tables, diagram, radioautographs, 2 ref. (S11, U, Pu)

251-S. Progress in Ultrasonic Examination. II. New Techniques and New Equipments. C. W. J. Vernon *Welding and Metal Fabrication,* v. 24, Apr. 1956, p. 124-133.

A review. Use of barium titanate, directional probes, and recorders. Field examinations. Diagrams, photographs, radiograph, sonogram. 4 ref. (S13)

252-S. Non-Destructive Testing of Metals. G. H. Thurston. *Western Ma-*

chinery and Steel World, v. 47, Apr. 1956, p. 112-115.

Radiography, magnetic particle inspection, ultra-sound, penetrant methods. Diagrams, photographs. (S13)

253-S. Separation of Vanadium From Titanium and Iron With a Cationite. L. M. Orlova. *Henry Brutcher Translation No.* 3654, 3 p. (From *Zavodskaya Laboratoriya,* v. 21, No. 1, 1955, p. 29-30.) Henry Brutcher, Altadena, Calif.

Vanadium is eluted as vanadium (V) by the presence of hydrogen peroxide in excess while titanium and iron salts are absorbed on the resin. Table. (S11, Fe, Ti, V)

254-S. Determination of Gases in Steel by Vacuum Fusion. Absorption of Gases by the Furnace. Shigeki Sawa. I. *Henry Brutcher Translation No.* 3647, 12 p. (From *Tetsu to Hagané,* v. 38, no. 8, Aug. 1952, p. 567-571.) II. *Henry Brutcher Translation No.* 3648, 19 p. (Abridged from *Tetsu to Hagané,* v. 38, no. 9, Sept. 1952, p. 672-678.) Henry Brutcher, Altadena, Calif.

An improved form of graphite spiral resistor furnace for vacuum fusion and determination of oxygen, nitrogen and hydrogen contents of steels. Rate of pumping furnace temperature for best results. Tables, diagrams, graphs. 4 ref. (S11, ST)

255-S. (German.) **Determination of Zinc in Aluminium.** E. Steuer. *Aluminium,* v. 32, no. 4, Apr. 1956, p. 205-208.

The zinc in aluminum and its alloys, bauxite, alumina and various secondary materials in the production of aluminum, determined polarographically with sodium pyrolidinedithiocarbamate. Tables. 3 ref. (S11, Zn, Al)

256-S. Determination of Fluoride in Chromium Plating Solutions. Joseph P. Branciaroli and June G. Coleman. *Analytical Chemistry,* v. 28, May 1956, p. 803-804.

Method separates fluoride by precipitating the interfering metal ions; it may be adaptable to other analytical problems. Graph, tables. 7 ref. (S11, L17, Cr)

257-S. Spectrophotometric Determination of Zirconium in Thorium. Louis Silverman and Dorothy W. Hawley. *Analytical Chemistry,* v. 28, May 1956, p. 806-808.

At a controlled high acidity, zirconium in the amount of 0.005 to 0.350% can be determined colorimetrically using alizarin red S. Graph, tables. 14 ref. (S11, Th, Zr)

258-S. Thoron—Tartaric Acid Systems for Spectrophotometric Determination of Thorium. F. S. Grimaldi and Mary H. Fletcher. *Analytical Chemistry,* v. 28, May 1956, p. 812-816.

Three tartaric acid-thoron systems differ with respect to the concentrations of thoron and tartaric acid. Mesotartaric acid is most effective in masking zirconium. The behavior of rarer elements, usually associated with thorium ores, is determined in two systems, and a dilution method is described for the direct determination of thorium in monazite concentrates. Graphs, tables. 7 ref. (S11, Th)

259-S. Flame Photometric Determination of Calcium in Furnace Slag. G. W. Standen and C. B. Tennant. *Analytical Chemistry,* v. 28, May 1956, p. 858-860.

Developed for rapid determination for calcium in the range of 30% by wt. Total elapsed time required for the flame analysis is 2 hr. Graph, tables. 5 ref. (S11, Ca)

260-S. Determination of Nickel in Oxidized Films on Nickel Metal. B. D. Brummet and R. M. Hollweg. *Analytical Chemistry,* v. 28, May 1956, p. 887-888.

The solvent used, 0.5% potassium cyanide, dissolves the oxidized film but not the nickel metal. Method is sensitive to microgram quantities of nickel. Graphs. 5 ref. (S11, Ni)

261-S. Statistical Controls. A Valuable Tool for Reducing Costs. Kenneth M. Smith. *Foundry,* v. 84, May 1956, p. 138-141.

A simple and practical method of controlling foundry variables. Graphs, table. (S12, E general)

262-S. System for Continuous Measurement of Oxygen in Open Hearth Furnaces. *Industrial Heating,* v. 23, Apr. 1956, p. 780, 782, 784, 786.

Designed for use with magnetic type oxygen analyzer, the new system solves the difficult problem of obtaining a continuous, dirt-free sample with a minimum of maintenance. Diagrams, photographs. (S11, D2)

263-S. Use of the Spectrograph in Fabrication Shops. Howard E. Boyer and Frank E. Fitzgerald. *Iron and Steel,* v. 29, Mar. 1956, p. 99-103.

A review of spectrochemical analysis: steps which are necessary in the establishment of a spectrographic set-up in a metal-working shop. Graphs, photographs, tables. (S11)

264-S. Nondestructive Testing of Electrical Forgings. R. H. Leith and

F. H. Oberlin. *Nondestructive Testing*, v. 14, Mar.-Apr. 1956, p. 14-16.

Magnetic particle and visual bore methods, application of some testing methods, special advantages of ultrasonics. Photographs. (S13)

265-S. The Photographic Monitoring of Stray X-Ray in the Radiography of Metals. R. B. Wilsey, D. H. Strangways and G. M. Corney. *Nondestructive Testing*, v. 14, Mar.-Apr. 1956, p. 18-23.

Method of monitoring stray radiation by means of photographic films carried by personnel; variation of film response with quality of radiation; possibility of secondary radiation from iron and lead (walls and shielding); film-calibration procedures. Graph, diagrams, tables. 11 ref. (S13, Fe, Pb)

266-S. The Application of Cesium-134 to Industrial Radiography. James W. Dutli and Dana E. Elliott. *Nondestructive Testing*, v. 14, Mar.-Apr. 1956, p. 24.

Cesium-134 has two of the three basic requirements for a practical, high-gamma-energy, radiographic source; long half-life and high specific activity. An experimental radiographic evaluation was made to verify its predicted usefulness. Diagram, graphs, radiographs, photographs, tables. 7 ref. (S13, Al, Cs, ST)

267-S. Ionography; A New Process of Radiographic Imaging. E. L. Criscuolo and D. T. O'Connor. *Nondestructive Testing*, v. 14, Mar.-Apr. 1956, p. 28-30.

System utilizes differential X-ray ionization of a layer of air immediately above a charged insulating surface, creating an electrostatic image corresponding to the differential ionization pattern and made visible by liquid deposition of fine particles. Offers significant advantages in speed and economy by virtue of its being a completely daylight process using an inexpensive reusable plate. Diagrams, graphs, photographs, tables. 5 ref. (S13)

268-S. Nomograms for Iridium-192 Radiography. Jerome G. Morse. *Nondestructive Testing*, v. 14, Mar.-Apr. 1956, p. 32-33.

Nomograms enable the decay of iridium-192 as a function of time, and the exposure time for radiography with iridium as the source of radiation to be estimated fairly accurately. Nomograms. 3 ref. (S13, Ir)

269-S. Specifications for Cold Rolled Strip Steel. Göran Molinder. *Sheet Metal Industries*, v. 33, no. 347, Mar. 1956, p. 203-204, 214.

Some views about specifications for cold rolled strip steel; information on standardization work going on in Sweden. (S22, F23, ST)

270-S. Electronic Inspection of Continuous Strip. Leo Walter, *Sheet Metal Industries*, v. 33, no. 347, Mar. 1956, p. 205-208.

With the application of photoelectric tubes, continuous automatic inspection has become possible for rapidly moving metal strips during rolling or continuous surface finishing, such as trimming and the like. Diagrams, photograph. 5 ref. (S14, F23)

271-S. (English.) **Spectrochemical Analysis of Gray and White Cast Iron.** C. Georg Carlsson. *Jernkontorets Annaler*, v. 140, no. 2, 1956, p. 137-147.

A direct-reading method gives high accuracy in determination of silicon in gray iron. Tables, diagram, graphs. 13 ref. (S11, Si, CI)

272-S. (English.) **Determination of Micro-Amounts of Indium in Zinc and in Gallium by Radioactivation.** J. Hoste and H. van den Berghe. *Mikrochimica Acta*, 1956, nos. 4-6 p. 797-803.

A method to determine micro-amounts of indium in zinc and gallium by radio-activation analysis, using 1 g. radium-barium as thermal-neutron source. Tables. 2 ref. (S11, In, Zn, Ga)

273-S. (English.) **Determination of Tin in Bismuth.** Ilana Levitan. *Spectrochimica Acta*, v. 7, no. 6, Mar. 1956, p. 395-396.

A method for determination of 0.01 to 1.00% of tin in bismuth. Analyses may be carried out with samples as small as 0.02 g. Graphs. 1 ref. (S11, Sn, Bi)

274-S. (Dutch.) **Comparison Between Material Testing by Means of Ultrasound as Continuous Sound and as Sound Impulses.** A. de Sterke. *Meatlen*, v. 11, no. 4, Feb. 29, 1956, p. 77-86, disc., p. 86-89.

Historical review. Details of continuous-sound method and impulse or reflection method. Specialized applications of both. Diagrams, table. (S13)

275-S. (French.) **Applications of Radio-Elements to Problems of Very High Purity Metals.** Ph. Albert. *Chimie & Industrie*, v. 75, no. 2, Feb. 1956, p. 275-286.

Methods of analysis. Radio-elements used as "tracers" allow studies on the kinetics of the elimination of an element from a metal undergoing a purifying treatment. Elimination of carbon from iron by an-

nealing in pure hydrogen. Tables, graphs, micrographs, diagrams, autoradiographs. 22 ref. (S19)

276-S. (French.) **Separation of Niobium and of Tantalum by Paper Chromatography.** E. Bruninx, J. Eeckhout, and J. Gillis. *Mikrochimica Acta,* 1956, nos. 4-6, p. 689-699.

The separation of niobium and tantalum on the microscale by paper chromatography. Various organic liquids were used as eluants. Tables, graphs, diagram. 7 ref. (S11, Cb, Ta)

277-S. (Polish.) **Technical Analysis of Amidosulphonic Acid.** M. Oktawiec. *Prace Instytutow Ministerstwa Hutnictwa,* v. 8, no. 1, 1956, p. 43-47.

A method and a simple apparatus which make possible a quick and sufficiently accurate determination of amidosulfonic acid both in the electrolytic bath used in refining of lead and in the technical product. Tables, diagram, photograph. 8 ref. (S11, C23, Pb)

278-S. (Russian.) **Chemical Separation and Analysis of Metallic Compounds in Some Nickel-Based Alloys.** R. B. Golubtsova and L. A. Mashkovich. *Doklady Akademii Nauk SSSR,* v. 106, no. 6, Feb. 21, 1956, p. 1011-1014.

Analysis of anode powders of binary alloys. Solubility of solid solutions in acid-methanol mixtures. Measurements of potential differences. Tables, graph. 8 ref. (S11, Ni, Ti)

279-S. (Russian.) **Automatization of Continuous Teeming of Steel.** *Stal',* v. 16, no. 3, Mar. 1956, p. 212-214.

Application of synthetic-radioactive isotopes to reliable devices for measurement and control of the level of the liquid metal. Photographs, diagrams. (S18, D9, ST)

280-S. (Russian.) **Determination of Cobalt and Nickel in Manganese Ores and Slags by Means of Ethyl Xanthate.** A. T. Pilipenko and V. A. Bogoliubskii. *Ukrainskii Khimicheskii Zhurnal,* v. 22, no. 1, 1956, p. 97-99.

Calorimetric determination of small quantities of cobalt. Separation of nickel in the form of ethyl xanthate complexes. Tables, graph. 7 ref. (S11, Co, Ni, Mn)

281-S. (Russian.) **Radioactive Methods of Metallophysical Investigations.** N. T. Gudtsov, L. I. Ivanov and M. P. Matveeva. *Vestnik Akademii Nauk SSSR,* v. 26, no. 3, Mar. 1956, p. 79-83.

Method and apparatus provide data for calculating evaporation rate and sublimation temperature; diffusion coefficients and diffusion activation energy; vapor pressure of pure iron, iron in alloys with chromium, and other iron alloys. Diagrams. (S19, P12, N1, Fe)

282-S. (Spanish.) **Rapid Determination of the Cobalt in Steels.** Faustino Velasco and Joaquin Hontoria. *Instituto del Hierro y del Acero,* v. 9, no. 43, Feb. 1956, p. 176-182.

A colorimetric and spectrophotometric method. Blue color formed by cobalt ion with the thiocyanate ion is extracted with cyclohexanone. Interference of the iron is eliminated by the use of ammonium citrate and disodium phosphate. Tables, graphs. 16 ref. (S11, ST, Co)

283-S. The Quality of Radiographic Inspection. D. T. O'Connor and E. L. Criscuolo. *ASTM Bulletin,* 1956, no. 213, Apr. 1956, p. 53-59.

An analysis of present radiographic requirements on a relative and on an absolute scale, from the point of view of radiographic coverage. A simple revision of existing penetrameter design and use which will permit three basic radiographic quality levels to be gaged simply and directly is proposed. Tables, graphs. 16 ref. (S13)

284-S. Small Shop Fights Back With Casting Quality. A. W. Schneble. *Iron Age,* v. 177, May 3, 1956, p. 98-99.

Statistical quality control, plus a tailored cost accounting system, help small job shops control quality. Diagram, graph. (S12, E general)

285-S. Rapid Procedure for the Determination of Calcium. Joseph R. Simmler. *Mallinckrodt Chemical Works, (U. S. Atomic Energy Commission)* NYO-5244, Mar. 1951, 9 p.

A gravimetric system with precipitation of the calcium in an ethylmethyl alcohol and a rapid semimicro volumetric scheme presented. Tables. (S11, Ca)

286-S. Application of X-Ray Fluorescence to Analysis of Zirconium in Uranium. W. F. Peed, W. B. Wright, Jr., and G. L. Rogosa. *Oak Ridge National Laboratory, (U. S. Atomic Energy Commission),* ORNL-1419, Dec. 1952, 15 p.

A rapid instrumental method. The precision and accuracy compare favorably with conventional methods. Tables, graphs. 4 ref. (S11, U, Zr)

287-S. An Indirect Colorimetric Method for the Determination of Uranium. D. L. Manning and J. C. White. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission),* ORNL-1476, Jan. 1953, 22 p.

An indirect colometric method for

the determination of uranium in the range 50 to 400 γ in a volume of 50 ml. based on the oxidation of uranium (IV) to uranium (VI) with iron (III) and determination of the iron (II) thus formed. Tables. 8 ref. (S11, U)

288-S. How to Choose the Right Copper. *Steel,* v. 138, May 7, 1956, p. 94-97.

Commercially available coppers and their engineering properties. Table, graphs, photographs. (S22, Cu)

289-S. Temperature Control of Heat Treating Furnaces. VI. Special Systems. R. M. Sills. *Steel,* v. 138, May 7, 1956, p. 116-117, 120.

Two-point, program, front setter, cascade and protection systems are supervisory controls that are frequently necessary. Photographs, diagrams. (S16, J general)

290-S. Gear Gaging Goes Automatic. T. S. Gates. *Tool Engineer,* v. 36, May, 1956, p. 95-99.

Automatic gear gages which check gears for size, eccentricity, helix angle, full-tooth and tooth thickness in various combinations and with electronic sound-discriminating devices which reject noisy gears. Diagrams, photographs. (S14)

291-S. Determination of Chromium in Plutonium. Maynard E. Smith. *University of California, Los Alamos Scientific Laboratory (U. S. Atomic Energy Commission),* AECD-4171, Apr. 1955, 27 p.

As little as 10 ppm. of chromium may be determined by the method. Standard deviations of 7 to 1 relative % were obtained for chromium concentrations of 40 ppm. to 1% respectively. Graphs, tables. 11 ref. (S11, Pu, Cr)

292-S. Aluminum Sheet and Plate Alloys. *Welding Engineer,* v. 41, May, 1955, p. 97.

Tabulated data covering major alloying elements, cladding alloy, forms produced and federal, military, A.S.T.M. and aeronautical specifications. Table. (S22, Al)

293-S. Temperature and Its Measurement. Paul H. Dike. Paper from "High-Temperature Technology". John Wiley & Sons. p. 335-382.

Pyrometry by radiation methods; high-temperature thermocouples and absolute noise thermometer. Diagrams, graphs, photograph, tables. 26 ref. (S16)

294-S. (German.) **Determination of Magnesium in Irons.** R. Reichert. *Zeitschrift für Analytische Chemie,* v. 150, no. 4, 1956, p. 250-253.

A fast titrimetric method using the disodium salt of ethylenediaminotetraacetic acid. Table. 16 ref. (S11, Mg, Fe)

295-S. (German.) **Spectrophotometric Micro Determination of Silicon in Cathode Nickel.** W. Gan. *Zeitschrift für Analytische Chemie,* v. 150, no 4, 1956, p. 254-263.

Method of determination of silicon within an exactness of $\pm 5\%$ at a silicon content of 0.200 to 0.005%, and with an accuracy of 10% at a silicon content of less than 0.005%. Graphs, tables. 15 ref. (S11, Ni, Si)

296-S. (Italian.) **Analysis of Aluminum in 75-80% Ferrosilicon.** Francesco Baldi and Raffaeallo Passeri. *Metallurgia Italiana,* v. 48, special supplement to no. 1, Jan. 1956, p. 8-14.

Method of analyzing powdered materials using a rotating electrode. Micrographs, graphs, photographs. 10 ref. (S11, Al, Fe, Si)

297-S. (Italian.) **On Some Causes of Error in the Spectrographic Analysis of Steels.** Bartolomeo Morello. *Metallurgia Italiana,* v. 48, special supplement to no. 1, Jan. 1956, p. 15-20.

Evaluation of errors caused by variations in equipment and materials. Graphs, tables, micrographs, 22 ref. (S11, St)

298-S. (Italian.) **Test Sample Pouring and Preparation in the Quantometric Analysis of Cast Iron.** Venceslao Pavanelli. *Metallurgia Italiana,* v. 48, special supplement to no. 1, Jan. 1956, p. 40-42.

Reproducibility of determinations on samples chilled by different methods. Diagram, tables, micrographs, photograph. 3 ref. (S11, CI)

299-S. (Italian.) **First Approach to Spectrographic Analysis of Copper-Base Alloys.** E. Baltera and M. L. Soragna. *Metallurgia Italiana,* v. 48, special supplement to no. 1, Jan. 1956, p. 43-47.

Sample preparation. Comparison of results obtained with two different spark dischargers. Examination of spark prints on test samples. Diagrams, micrographs, graphs. 8 ref. (S11, Cu)

300-S. (Russian.) **Apparatus for the Precise Measurement of High Temperatures.** V. V. Kandyba. *Izmeritel'naia Teknika,* 1956, no. 1, Jan.-Feb. 1956, p. 36-38.

Characteristics and accuracy of pyrometers of various types used in the Soviet Union. Photograph. (S16)

301-S. (Russian.) **Measuring the Temperature of Liquid Steel.** *Zavodskaia Laboratoriia,* v. 22, no. 3, Mar. 1956, p. 259-261.

Survey of methods of using thermocouples composed of platinum alloys with varying amounts of rhodium in the Soviet area and abroad. Movement toward automation. (S16, D general, SG-a, ST)

302-S. (Book.) **The Analysis of Minerals and Ores of the Rarer Elements.** W. R. Schoeller and A. R. Powell. (3rd Ed. Rev. by A. R. Powell.) 408 p. 1955. Hafner Publishing Co., 31 E. 10th St., New York, N. Y.

Latest developed analytical methods, manual for analytical chemists, metallurgists and advanced students. (S11)

303-S. (Book.) **Proceedings of the International Conference on the Peaceful Uses of Atomic Energy.** Applications of Radioactive Isotopes and Fission Products in Research and Industry, v. XV, 327 p. 1956. United Nations, New York. $7.50.

Compilation of papers covering radioactive isotopes in research, control and technology, and fission products and their applications. (S19)

304-S. Application of Radiography in the Manufacture of Bronze Castings. N. A. Kahn, Solomon Goldspiel and R. R. Waltien. *American Foundrymen's Society, Preprint No.* 56-3, 1956, 18 p.

A series of radiographs and allied material to illustrate the application and value of radiography in the bronze foundry. Includes brief discussion of radiography and the importance of standards for its optimum utilization. Diagrams, graph, radiographs, gammagraphs, photographs. 19 ref. (S13, E general, Cu)

305-S. Practical Foundry Application of Statistical Quality Control. Ross Martin, Jr. *American Foundrymen's Society, Preprint No.* 56-53, 1956, 3 p.

Establishing standard variation in process, applying control charts, controlling casting weight, molding sand control in foundry. (S12)

306-S. A Survey of Uranium Metal-Testing Methods. J. L. Hyde. *Argonne National Laboratory (U. S. Atomic Energy Commission),* ANL-4801, May 1952, 17 p.

Theory and practice of reactor testing; other methods for determining quality of uranium. Tables. 26 ref. (S11, S general, U)

307-S. Analysis of Electroplating Solutions. Estimation of Boric Acid in the Presence of Nickel and Ammonium Salts. M. R. Verma and K. C. Agrawal. *Metal Finishing,* v. 54, May 1956, p. 64-65.

Method developed for determining boric acid by the formaldehyde method in the presence of nickel and ammonium salts and the factors affecting these determinations. 9 ref. (S11, L17, Ni)

308-S. The Use of Radioactive Isotopes in Metallurgical Research. S. M. Makin. *Metal Treatment and Drop Forging,* v. 23, Apr. 1956, p. 127-130.

Review of metallurgical work now in progress involving the use of radioactive isotopes. Autoradiograph, diagrams, tables. 14 ref. (S19)

309-S. Manual of Analytical Procedures for the U235 Recovery Process. M. T. Kelley, P. F. Thomason, L. T. Corbin, S. A. Reynolds, C. L. Burros and E. J. Frederick. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission),* ORNL-983, Aug. 1951, 156 p.

Ionic, radiochemical and phyical analytical procedures most suitable for control of the process. Tables, graphs, diagrams, photographs. 76 ref. (S11, U)

310-S. Plant Application of Acceptance Sampling by Attributes. S. E. Peters. *Tooling and Production,* v. 22, May 1956, p. 83-85.

Comparison of four sampling plans which might be used in place of inspection by assemblers. Photographs, table. (S12)

311-S. Quality Control of Job Lot Production. Joseph Kalmanek. *Tooling and Production,* v. 22, May 1956, p. 118, 232.

Advantages and disadvantages of a statistical quality control program as applied to a quality product. Photographs. (S12)

312-S. Physico-Chemical Methods of Uranium Production Control. A. P. Vinogradov. Paper from "Proceedings of the International Conference on the Peaceful Uses of Atomic Energy. v. VIII. Production Technology of the Materials Used for Nuclear Energy". United Nations. p. 206-215.

Research concerned with the development of direct physico-chemical methods of determining uranium and its mixtures on a large scale, without preliminary chemical separation or concentration. Tables, graphs, oscillograms, X-ray spectra. 8 ref. (S11, U)

313-S. The Analysis of Low-Grade Uranium Ores and Their Products.

M. D. Hassialis and R. C. Musa. Paper from "Proceedings of the International Conference on the Peaceful Uses of Atomic Energy. v. VIII. Production Technology of the Materials Used for Nuclear Energy". United Nations. p. 216-221.

Fluorimetric method; mass spectrometric isotope dilution method. Tables. 8 ref. (S11, U)

314-S. The Physical Method of Determining the Content of Uranium, Radium and Thorium in Radioactive Ores. G. R. Golbek, V. V. Matvejev and R. S. Shliapnikov. Paper from "Proceedings of the International Conference on the Peaceful Uses of Atomic Energy. v. VIII. Production Technology of the Materials Used for Nuclear Energy". United Nations. p. 234-240.

An apparatus was designed and constructed that made possible a single and simultaneous determination of uranium, radium and thorium content based on measurements of beta and gamma radiation. Diagrams, photographs, tables. 4 ref. (S11, Th, Ra, U)

315-S. Analysis of Mixed Uranium and Thorium Ores by the Measurement of Gamma Radiation. A. M. Baptista and J. Palacios. Paper from "Proceedings of the International Conference on the Peaceful Uses of Atomic Energy. v. VIII. Production Technology of the Materials Used for Nuclear Energy". United Nations. p. 241-245.

Apparatus, principles and testing of the analytical method. Tables, graphs, photograph. (S11, U, Th)

316-S. Determination of the U^{235} Content in Uranium by a Radiochemical Method. I. G. deFraenz and W. Seelman-Eggebert. Paper from "Proceedings of the International Conference on the Peaceful Uses of Atomic Energy. v. VIII. Production Technology of the Materials Used for Nuclear Energy". United Nations. p. 246-249.

Details of method; its application to the analysis of depleted uranium; precision obtained with enriched uranium samples. Graphs. 6 ref. (S11, U)

317-S. Polarography of Uranium: Polarographic Determination of Uranium in Ores Without Preliminary Chemical Separation. Milenko V. Susic. Paper from "Proceedings of the International Conference on the Peaceful Uses of Atomic Energy. v. VIII. Production Technology of the Materials Used for Nuclear Energy". United Nations. p. 254-259.

An investigation of uranium and other elements in acidic and alkaline ascorbic supporting electrolyte. Tables. 17 ref. (S11, U)

318-S. Separation of Alkali Metals and Alkaline-Earth Metals From Uranium and Their Determination by Flame Spectrophotometry. Julia F. Possidoni de Albinati and Jorge H. Capaccioli. Paper from "Proceedings of the International Conference on the Peaceful Uses of Atomic Energy. v. VIII. Production Technology of the Materials Used for Nuclear Energy". United Nations. p. 299-306.

Reagents and instruments; spectra of alkali metals and alkaline-earth metals; calibration curves and their analytical application. Tables, graphs. 10 ref. (S11, U)

319-S. Estimation of Traces of Gallium, Indium and Thallium by Flame Spectrophotometry, Its Application in the Analysis of High Purity Uranium. A. E. Lagos. Paper from "Proceedings of the International Conference on the Peaceful Uses of Atomic Energy. v. VIII. Production Technology of the Materials Used for Nuclear Energy". United Nations. p. 307-312.

Separation from uranium by ether extraction from the nitrates in a nitric acid medium. Tables, graphs. 8 ref. (S11, U, Tl, In, Ga)

320-S. Estimation of Lanthanum, Iron, and Magnesium by Flame Spectrophotometry. Julia Flavia Possidoni de Albinati. Paper from "Proceedings of the International Conference on the Peaceful Uses of Atomic Energy. v. VIII. Production Technology of the Materials Used for Nuclear Energy". United Nations. p. 313-319.

A study of the possibility of determining iron, magnesium and lanthanum together or by the separation of the iron as a chloride in 6*M* hydrochloric medium, after uranium extraction. Diagram, tables, graphs. 13 ref. (S11, U, La, Fe, Mg)

321-S. (Spanish.) **The Determination of Nitrogen in Steels.** R. Suarez Acosta. *Instituto del Hierro y del Acero,* v. 9, no. 44, Mar. 1956, p. 315-319.

Bibliographical review of different processes for determining gases in steels, with special mention of determination of nitrogen by chemical and vacuum diffusion methods. Describes new apparatus for analyzing gases in steels. Photographs. 8 ref. (S11, ST)

322-S. Spectrophotometric Determination of Microquantities of Beryllium with *p*-Nitrobenzene-Azo-Orcinol. J.

L. Huguet and A. Aguilo. Paper from "Proceedings of the International Conference on the Peaceful Uses of Atomic Energy. v. VIII. Production Technology of the Materials Used for Nuclear Energy". United Nations. p. 325-338.

Reaction of beryllium with the dye produces, over a specific pH range, a single red highly dissociated complex, enabling spectrophotometric determination under strictly controlled conditions. Micrographs, tables, graphs, photograph. 35 ref. (S11, Be)

323-S. Separation and Determination of Zirconium in Samples of Uranium and Beryllium. J. F. Possidoni de Albinati and J. H. Capaccioli. Paper from "Proceedings of the International Conference on the Peaceful Uses of Atomic Energy. v. VIII. Production Technology of the Materials Used for Nuclear Energy". United Nations. p. 344-349.

Separation and spectrophotometric determination methods; influence of uranium, beryllium, iron, thioglycolic acid and thorium on zirconium colorimetry. Graphs, tables. 6 ref. (S11, Be, U, Zr)

324-S. Determination of Microquantities of Cadmium in Uranium. Rafael H. Rodriguez Pasqués and Julia F. Possidoni de Albinati. Paper from "Proceedings of the International Conference on the Peaceful Uses of Atomic Energy. v. VIII. Production Technology of the Materials Used for Nuclear Energy". United Nations. p. 350-355.

Spectrophotometry of the red-colored compound of cadmium with diphenylthiocarbazone. Tables, graphs. 13 ref. (S11, Cd, U)

325-S. The Use of Radioactive Isotopes in the Study of the Analytical Chemistry of Zirconium and Hafnium. N. S. Poluectov. Paper from "Proceedings of the International Conference on the Peaceful Uses of Atomic Energy. v. VIII. Production Technology of the Materials Used for Nuclear Energy". United Nations. p. 572-579.

Determination of zirconium in ores. Methods for separating hafnium by means of distributive chromatography on paper and by counter-current extraction. Tables. 13 ref. (S11, Hf, Zr)

326-S. (Polish.) **Determining Internal Defects of Steel.** J. Gorecki and J. Janicki. *Wiadomosci Hutnicze,* v. 12, no. 3, Mar. 1956, p. 70-77.

Classification of defects and methods of detection, including recognition of impurities. Deep etching, color, other tests. Diagrams, tables, photographs. 5 ref. (S13, ST)

327-S. (Russian.) **Radioactive Isotopes in Metallurgy.** Iu. V. Kornev. *Metallurg,* no. 1, Jan. 1956, p. 15-19.

A popularization of general principles for application of radioactive isotopes in metallurgical practice. Diagrams. (S19)

328-S. Quantitative Spectrographic Determination of Zirconium and Niobium in Uranium Metal. J. A. Goleb. *Analytical Chemistry,* v. 28, June 1956, p. 965-967.

A spectrographic method enables fast routine analyses of a large number of uranium metal samples containing about 5.5% zirconium and 1.5% niobium. Excitation is by a high-voltage condensed spark. Tables, graphs. 4 ref. (S11, Cb, V, Zr)

329-S. Spectrographic Determination of Rhodium in Platinum-Rhodium Alloys. Arpad Bardocz and Ferenc Varsanyi. *Analytical Chemistry,* v. 28, June 1956, p. 989-993.

Investigations carried out for the alloy content range of 1 to 25% of rhodium. The solutions were excited by the rotating pin electrode technique. Graphs, diagram, tables. 16 ref. (S11, Rh, Pt)

330-S. Semiquantitative Spectrochemical Analysis of Silicon. Paul H. Keck, A. L. MacDonald and J. W. Mellichamp. *Analytical Chemistry,* v. 28, June 1956, p. 995-996.

The impurities that may be present in high-purity silicon are concentrated by the condensation of the distillate from a molten bead of silicon in a specially designed vacuum system. The silicon is melted by high-frequency induction, and the resultant distillate is spectrochemically analyzed. Table, diagram. 7 ref. (S11, Si)

331-S. Determination of Trace Elements in Titanium by Neutron Activation Analysis. W. A. Brooksbank, Jr., G. W. Leddicotte and S. A. Reynolds. *Analytical Chemistry,* v. 28, June 1956, p. 1033-1035.

Determinations of microgram and submicrogram concentrations of many elements when they appear as impurities in titanium and its alloys. Tables, graph. 8 ref. (S11, Ti)

332-S. Simultaneous Determination of Carbon and Hydrogen in Titanium and Titanium Alloys. R. B. Nunemaker and S. A. Shrader. *Analytical Chemistry,* v. 28, June 1956, p. 1040-1042.

Use of microcombustion technique.

The titanium is burned in oxygen, using a iron-copper-tin flux at 1200° C. The carbon and hydrogen are converted to carbon dioxide and water. Diagram, tables. 8 ref. (S11, Ti)

333-S. British Standards for Aluminium and Its Alloys—1955 Revisions. E. Elliott. *Metallurgia,* v. 53, no. 318, Apr. 1956, p. 157-162.

Revisions in standards for nomenclature of materials, dimensional tolerances and individual specifications. Tables. 3 ref. (S22, Al)

334-S. Liquid-Liquid Extraction Procedures in Inorganic Analysis. III. A Review of Practical Applications With Particular Reference to Metallurgical Analysis. T. S. West. *Metallurgia,* v. 53, no. 318, Apr. 1956, p. 185-188.

The extraction of aluminum, gallium, indium, tantalum, and rare earths. Tables. 31 ref. (To be continued.) (S11, EG-g, Ta, In, Ga, Al)

335-S. Radioisotopes—Versatile Research Tools. G. D. Calkins. *Nucleonics,* v. 14, May 1956, p. 42-43.

Examples illustrating the breadth and diversity of radiotracing techniques. Micrograph, autoradiograph. 5 ref. (S19)

336-S. Industrial Thickness Gages. George B. Foster. *Nucleonics,* v. 14, May, 1956, p. 66-67.

Significance of an automatic, continuous noncontacting gage using radiation to measure and control product thickness is considered. Typical improvements in process control upon instituting radioactive gaging tabulated. Photographs. (S14)

337-S. Appraising the Quality of Tinplate. W. E. Hoare. *Sheet Metal Industries,* v. 33, no. 348, Apr. 1956, p. 239-242, 246.

Thickness of tin coating, determination of tin-iron alloy, porosity and corrosion tests. Photographs. (S14, L16, Sn)

338-S. (English.) **Studies on the Determination of Metals by Extraction Method of Metal Organic Compound. IX. Determination of Antimony and Bismuth With Antipyrine and Potassium Iodide.** Emiko Sudo. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 7, no. 6, Dec. 1955, p. 568-574.

Antimony and bismuth, when potassium iodine and antipyrine were added to them in acid solution, formed compounds of antipyrine-antimony iodide and antipyrine-bismuth iodide respectively which could be extracted with an organic solvent, and photometrically determined. Table, graphs, ultraviolet spectro. 4 ref. (S11, Sb, Bi)

339-S. (English) **Studies on Flame Spectrochemical Analysis. II. Determination of Microamounts of Calcium and Magnesium.** Shigero Ikeda. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 7, no. 6, Dec. 1955, p. 575-582.

Various alcohols were adopted as solvents to intensify the excitation of flame emission of calcium and magnesium. Methyl alcohol was found to be the most effective solvent to increase the sensitivity of the emission intensity of these two elements. Tables, graphs. 2 ref. (S11, Ca, Mg)

340-S. (French.) **Examining With Magnetic Powders. Some Considerations Relative to a Standardization of the Test.** R. Castro. *Centre de Documentation Siderurgique, Circulaire d'Informations Techniques,* v. 13, no. 4, 1956, p. 787-795.

Magnetization by passing a direct current through a steel piece, magnetization by a spool around the piece, possibilities of standardizing the magnetic powder test. Tables, diagrams. (S13, ST)

341-S. (German.) **Hydrogen Determination in Electric-Furnace Steels.** Werner Geller, Karl Bungardt and Peter Hammerschmid. *Archiv für das Eisenhüttenwesen,* v. 27, no. 4, Apr. 1956, p. 235-240.

Sampling, determination of diffusionable hydrogen at 600° C. and hydrogen inclusion. Hydrogen behavior during steel production in basic electric furnace. Graphs, diagrams. 29 ref. (S11, D5, ST)

342-S. (German.) **Photometric Investigation of Cast Iron and Steel.** H. Kopp and E. Zindel. *Giesserei,* v. 43, no. 9, Apr. 26, 1956, p. 210-216.

Compilation and simplification of photometric methods existing in the literature. Ways of analysis, chemicals and reagents necessary for the above. 4 ref. (S11, ST, CI)

343-S. (German.) **Continuous Mass-Spectrographic Gas Analysis in a Vacuum Furnace.** H. Landsberg, E. E. Escher and St. A. Dawkins. *Vakuum-Technik,* v. 5, nos. 1-2, Apr. 1956, p. 1-7.

Application of a mass spectrometer in production process analysis during metal smelting in a vacuum furnace. Tables, graphs, diagrams. (S11, C25, D8)

344-S. (Hungarian.) **Determination of the Nitrogen Content of Cermets.** Karoly Györbiro and Eleonora M.

Romwalterné. *Kohaszati Lapok,* v. 11, no. 3, Mar. 1956, p. 112-114.

Determination based on converting the bound nitrogen ammonia salt. Methods for dissolving cermets and for ammonia determination. Tables, diagram. 8 ref. (S11, C-n, N)

345-S. (Japanese.) **Rapid Determination of Small Amounts of Carbon in Iron and Steel. I. Modification of the Gas Volumetric (Gakushin) Method for Determining Low Carbon Contents.** Takuho Ikegami, Ohiko Kammori and Akira Amano. *Iron and Steel Institute of Japan, Journal,* v. 41, no. 5, May 1955, p. 531-535.

0.01 to 0.5% carbon in iron and steel can be determined with an accuracy of ±0.002% within about 12 min. Method has disadvantage of needing temperature and drainage corrections after each measurement of gas volume. Diagram, graphs, table. 9 ref. (S11, Fe, ST)

346-S. Routine Aircraft Inspection by Radiography. *Engineering,* v. 181, May 11, 1956, p. 338-341.

Developments by British airlines and manufacturers; aircraft radiography on the Continent. Photographs, radiograms. (S13, Al)

347-S. Testing the Gas-Content of Molten Metals in a Foundry. B. R. Deoras and V. Kondic. *Foundry Trade Journal,* v. 100, May 24, 1956, p. 361-364, 366.

Results justify the application of the density test under actual foundry conditions. Comment on the qualitative reduced-pressure test for gas in aluminum alloys. Graph, diagrams, tables. 7 ref. (S11, E25)

348-S. Application of the Electron Probe Microanalyser. J. Philibert and C. Crussard. *Iron and Steel Institute, Journal,* v. 183, May 1956, p. 42-47.

Instrument permits elementary point analyses to be made over an area of 1 to 2 μ diam. It is useful in studies of iron ores, selective oxidation during the formation of scale, segregation of chromium, nickel and manganese; transformation in steels and in diffusion problems. Tables, photographs, micrographs. 7 ref. (S11, M23)

349-S. Spectrophotometric Determination of Zirconium in Thorium. Louis Silverman and Dorothy W. Hawley. *North American Aviation, Inc. Atomics International (U. S. Atomic Energy Commission),* NAA-SR-1446, May 1956, 16 pages.

The colorimetric determination of zirconium using sodium alizarin sulfonate as reagent was adapted to tolerate at least 200 mg. of thorium. Graphs, tables. 15 ref. (S11, Th, Zr)

350-S. Planning for Tomorrow's Gaging. Louis O. Heinhold, Jr. *Tool Engineer,* v. 36, June 1956, p. 95-100.

Present status and future prospects for automatic gaging. Gages for small lot production. Tape controlled gages. Photographs. (S14)

351-S. (English.) **New Methods of Gear Inspection.** M. D. Genkin. *Acta Technica Academiae Scientiarum Hungaricae,* v. 14, nos. 3-4, 1956, p. 267-278.

Two gear inspection methods based on judging the quality of gears according to the composite error of contact and noise produced. Graphs, photographs, diagrams, oscillograms. (S14, S13)

352-S. (Czech.) **Testing Light Alloys With Testing Coil.** M. Jancova. *Strojirenstvi,* v. 6, no. 5, May 1956, p. 336-338.

Methods based on changes of electrical conductivity of materials tested. Description of apparatus. Graphs, diagrams. 5 ref. (S13, EG-a)

353-S. (French.) **Rapid Analysis of Stainless Steels.** J. Culberston and R. M. Fowler. *Metallurgie,* v. 88, no. 4, Apr. 1956, p. 359, 361, 363, 365.

Different colorimetric methods used to determine chromium, nickel and manganese in steels. New method uses a Beckman spectrophotometer. Tables, photograph. 7 ref. (S11, SS, Cr, Mn, Cr)

354-S. (French.) **Utilization of Platinum Metals in Thermometry.** R. Lacroix. *Revue de Métallurgie,* v. 53, no. 1, Jan. 1956, p. 48-56.

Fire resistance, chemical passivity and availability in high-purity condition make platinum and platinum-rhodium alloys desirable in resistance thermometers and thermo-elements for high precision measurements. Tables. 16 ref. (S16, Rh, Pt)

355-S. (French.) **A Study on the Sensitivity of Gamma-Radiographic Examination of Cast Iron and Aluminum Alloy Pieces With Iridium-192.** A. Blondel and P. Broquet. *Revue de Métallurgie,* v. 53, no. 3, Mar. 1956, p. 233-239.

Pieces of cast iron and A-U5 alloys, with thicknesses varying from 5 to 60 mm., were examined and the detection sensitivities determined with penetrameters and by the contrast film method. Diagrams, graphs. 10 ref. (S13, Al, CI)

356-S. (German.) **New Optical Method of Measurement of Thinnest Films, Also of Corrosion Layers.** H. Schopper. *Forschung auf dem Gebiete des*

Ingenieurwesens, v. 22, Ausgabe B, no. 2, 1956, p. 56-62.

Improved method of measuring up to single-atom layers by means of interferometry. Diagrams, graphs. 33 ref. (S15)

357-S. (Russian.) **Ultrasonic Detection of Flaws in Butt-Welded Joints.** A. K. Gurvich. *Avtomaticheskaia Svarka,* v. 9, no. 2, Mar.-Apr. 1956, p. 68-75.

Ultrasonic detection methods, apparatus and devices for more accurate ultrasonic inspection, graphic data on their performance. Diagrams, graphs, photographs. 2 ref. (S13)

358-S. (Russian.) **Detection of Nickel Traces by the Method of Precipitation Chromatography.** V. V. Oshtshapovsky, *Zhurnal Analiticheskoi Khimii,* v. 11, no. 2, Mar.-Apr. 1956, p. 170-176.

Nickel may be detected by method of precipitation chromatography with dimethylglyoxime in the presence of great amounts of cobalt, iron, and copper ions. Tables. 16 ref. (S11, Ni)

359-S. (Spanish.) **Recommendations for Defining the Minimum Conditions Necessary for Rolled or Forged Structural Carbon or Low-Manganese Steels Suitable for Electric Arc Welding.** *Ciencia y Técnica de la Soldadura,* v. 6, no. 29, Mar.-Apr. 1956, 6 p.

Recommendations are applicable to sheet, rods, profiles and plates used in metal construction. Tables. (S22, K1, ST)

360-S. Determination of "Active" Sulfur Content of Sulfur-Bearing Cutting Fluids. O. L. Brandes. *ASTM Bulletin,* 1956, no. 214, May 1956, p. 28-30.

Tests followed Federal Specification VV-0-283. Results of participating laboratories were in general agreement. Tables. (S11, G21)

361-S. Instruments for Pyrometry. Leo Walter. *British Steelmaker,* v. 22, June 1956, p. 164-166.

Survey of recently developed instruments for indicating, recording and controlling temperatures. Photographs, diagrams. (S16)

362-S. Surface Inspection of Hot Rolled Coil Rod and Bars. William C. Campbell. *Iron and Steel Engineer,* v. 33, May 1956, p. 55-57; disc., p. 58-59.

Inspection practices applied to steel for use in cold heading and cold forming such products as bolts and nuts. Photographs. (S13, ST)

363-S. New Standards Aid Selection of Die Casting Alloys. *Machine Design,* v. 28, June 14, 1956, p. 112.

A report on eight new standards for aluminum, magnesium and brass alloys. Table. (S22, E13, Al, Mg, Cu)

364-S. Russians Use Tagged Isotopes to Study Steelmaking. *Metal Progress,* v. 69, June 1956, p. 62-65.

Radioactive elements used to study passage of stock through blast furnaces, wear of refractories, refining reactions in steelmaking and origin of inclusions in ball bearing steel. Graph. (S19, D general, ST)

365-S. Analytical Determination of Trace Constituents in Metal Finishing Effluents. XV. The Colorimetric Determination of Cyanates in Effluents. D. G. Gardner, R. F. Muraca and E. J. Serfass. *Plating,* v. 43, June 1956, p. 743-746.

Method gave satisfactory results in the presence of 100 p.p.m. of each of 23 elements and ammonium, cyanide and thiocyanate ions in simultaneous admixture. 5 ref. (S11, L17)

366-S. Complexometric Determination of Copper in Copper Cyanide-Rochelle Salts Plating Baths. Clarence E. Gehrand. *Plating,* v. 43, June 1956, p. 747.

Procedure makes use of disodium dihydrogen ethylene-diaminetetracetate dihydrate, using Murexide as an indicator and allows production of plating solution with known copper content. 4 ref. (S11, L17, Cu)

367-S. Stainless and Heat-Resisting Steels. A. J. Turnell. *Welding and Metal Fabrication,* v. 24, June 1956, p. 214-216.

U. S. specifications and their British equivalents. Tables. (S22, SS-h)

368-S. Electrolytic Separation and Volumetric, Absorptiometric and Coulometric Estimation of Thallium. William T. Foley and Roswell F. Pottie. *Analytical Chemistry,* v. 28, July 1956, p. 1101-1104.

Equipment and procedures. (S11, T1)

369-S. Isolation and Measurement of Uranium at the Microgram Level. Charles L. Rulfs, Anil K. De and Philip J. Elving. *Analytical Chemistry,* v. 28, July 1956, p. 1139-1143.

A double cupferron separation of uranium using extraction was adapted to the micro level. (S11, U)

370-S. Assay for Platinum Metals in Ores and Concentrates. K. Hoffman, A. D. Westland, C. L. Lewis and F. E. Beamish. *Analytical Chemistry,* v. 28, July 1956, p. 1174-1177.

Data indicate that no advantage is to be gained by elaborate, time-consuming leaching methods prior to fire assay. (S11, Pt)

371-S. Simple Indicator Method for Determination of Aluminum. R. V. Paulson and J. F. Murphy. *Analytical Chemistry,* v. 28, July 1956, p. 1182-1184.

Volumetric method used for control of aluminum concentration in solutions used in finishing aluminum. (S11, L general, Al)

372-S. Improved Spot Test for Boron and a Quantitative Estimation of Boron in Very Dilute Solutions. T. S. Burkhalter and Dixon W. Peacock. *Analytical Chemistry,* v. 28, July 1956, p. 1186-1188.

Test using sorbitol combines ease of procedure, reproducibility and high sensitivity. (S11, B)

373-S. Fire Assay for Platinum. I. Hoffman and F. E. Beamish. *Analytical Chemistry,* v. 28, July 1956, p. 1188-1193.

Distribution of platinum during the various processes involved in a fire assay examined. Acceptable over-all recoveries were obtained except where the slags contained considerable nickel. (S11, Pt)

374-S. The Determination of Thorium in Ores by the Column Method. R. J. Guest. *Canada, Department of Mines and Technical Surveys, Mines Branch Technical Paper No.* 1, 1953, 24 p.

Thorium is selectively extracted from ores with ethernitric solvent through a column of activated alumina and activated cellulose. Specimens having a thorium content of less than 0.1% can be determined colorimetrically. (S11, Th)

375-S. The Colorimetric Determination of Copper With 2,2-Diquinolyl in Minerals and Ores. R. J. Guest. *Canada, Department of Mines and Technical Surveys, Mines Branch, Technical Paper No.* 3, 1953, 18 p.

Cuproine forms an intensely colored purple complex with cuprous ions. The color of the complex bears a linear relationship to the copper present. (S11, Cu)

376-S. The Determination of Aluminum by the Fluorophotometric Method. J. B. Zimmerman. *Canada, Department of Mines and Technical Surveys, Mines Branch, Technical Paper No.* 4, 1953, 12 p.

Impurities in samples in solution are precipitated with sodium hydroxide. An aliquot containing soluble sodium aluminate is adjusted to pH 4.6, 8-hydroxy-quinoline is added and the complex aluminum 8-hydroxyquinolate is extracted with chloroform and measured fluorimetrically at 560 mu. (S11, Al)

377-S. The Determination of Uranium in Concentrates by the Fluorophotometric Method. J. B. Zimmerman, F. T. Rabbitts and E. D. Kornelsen. *Canada, Department of Mines and Technical Surveys, Mines Branch, Technical Paper No.* 6, 1953, 9 p.

Fluorophotometric method has been extended to the analysis of gravity and chemical concentrates for uranium. A modified micropipette is used to minimize pipetting errors. A good statistical average is obtained from a large number of determinations. (S11, U)

378-S. Testing and Inspection of Materials and Welded Work for Hydraulic Power Plants. W. Stauffer and A. Keller. *Escher Wyss News,* v. 29, Jan.-Apr. 1956, p. 35-48.

Consideration is given to design, fabrication and examination of welded steel sections. (S13, K1, ST)

379-S. Evaluation of Valve Mechanical Characteristics. J. T. Ward and Otto Kneisel. *Instruments and Automation,* v. 29, June 1956, p. 1121-1123.

Some common tests used to evaluate control-valve mechanical characteristics; casting and and forging inspection, stem finish, actuator rating, actuator leakage and body rating. (S14, S13)

380-S. Cracking of DTD.247. M. H. Davies. *Iron & Steel,* v. 29, June 1956, p. 321-322.

Investigation of failure in a high thermal expansion alloy. Use of annealed drawn tubes, or full annealing of machined tubes subsequent to machining recommended. (S21, Q26, SG-s)

381-S. International Standards for Wrought Light Alloys. III. French Standards. *Light Metals,* v. 19, June 1956, p. 185-186.

Terminology, classification, composition limits, mechanical properties, dimensional tolerances, testing and marking. (To be continued.) (S22, Al)

382-S. Measurement and Control of the Temperature of Moving Parts. I. D. A. Senior. *Machinery Lloyd (Overseas Ed.)* v. 28, June 9, 1956, p. 70-74.

Thermal expansion devices, thermo-electric devices and resistance thermometers considered. (S16)

383-S. Surface Roughness and the Design Engineer. Joseph Manuele. *Magazine of Standards,* v. 27, June 1956, p. 167-171, 190-191.

Development of surface roughness standards. (S15, S22)

384-S. Wall Thickness of Tubing Gaged by Weight. *Metal-Working,* v. 12, July 1956, p. 10-11.

Control of stainless steel hypodermic needle tubing. (S14, SS)

385-S. Getting More Range From an Air Gauge. L. E. Abbott and A. F. Pomeroy. *Metalworking Production,* v. 100, June 8, 1956, p. 708-710.

Mechanism for checking drawn tubing for microwave equipment will indicate 0.005 in. above and below nominal dimension. (S14)

386-S. Raw Materials Development Laboratory Handbook of Analytical Methods. Michael A. DeSesa. *National Lead Company, Inc., Raw Materials Development Laboratory (U. S. Atomic Energy Commission),* TID-7002, Mar. 1956, 117 p.

Compilation of 34 tested methods related to uranium processing. (S11, U)

387-S. Nondestructive Testing on the Southern Pacific Railroad. A. S. Pedrick. *Nondestructive Testing,* v. 14, May-June 1956, p. 10-13, 16.

Application of magnetic-particle inspection, radiography, ultrasonic technique and black light to railroad maintenance. Use of reflectoscope. (S13)

388-S. Measurement of Coating Thicknesses by Use of Pulsed Eddy Currents. Donald L. Waidelich. *Nondestructive Testing,* v. 14, May-June 1956, p. 14-16.

Theoretical considerations; equipment used. (S14, L22)

389-S. Characteristics of a Closed-Link Television X-Ray Inspection System. D. Polansky and E. L. Criscuolo. *Nondetructive Testing,* v. 14, May-June 1956, p. 18-21.

Outstanding features are its ability to present an image at very low intensities and the fact that it is a filmless method of inspection that can be used throughout the complete X-ray energy range. (S13)

390-S. SIMAC-Sonic Inspection, Measurement, and Control. F. E. Pringle, Jr. *Nondestructive Testing,* v. 14, May-June 1956, p. 22-25; 28.

Searching units, transmitter equipment, receiver and methods of presentation (audible by meter, cathode-ray equipment or recorder); possibility of automation in such testing. (S13)

391-S. Application of Nondestructive Testing in the Manufacture of Aviation Gas Turbine Engines. F. W. Rohde. *Nondestructive Testing,* v. 14, May-June 1956, p. 26-28.

Testing of raw materials; testing during manufacture, assembly, operation and service life. (S13)

392-S. A Scintillation Count-Rate Meter for Gamma Radiation. Jerome G. Morse and Arthur W. Kneibler, Jr. *Nondestructive Testing,* v. 14, May-June 1956, p. 30-32.

Instrument surpasses the Geiger-Muller tube in sensitivity, mechanical strength, inherent versatility and accuracy, and requires less time for resolution. (S13)

393-S. Non-Destructive Testing. G. H. Thurston. *Western Machinery and Steel World,* v. 47, June 1956, p. 78-80.

Use of photographic and visual aids in helping the production executive determine exactly what he is doing with machines and processes. (S15, S13)

394-S. (English.) **Separation and Identification of Molybdenum and Tungsten.** L. C. F. Blackman. *Mikrochimica Acta,* 1956, no. 9, p. 1366-1368.

A simple and rapid ring-oven method. (S11, Mo, W)

395-S. (English.) **Studies on Flame Spectrochemical Analysis. III. Determination of Magnesium in Aluminium Alloy.** Shigero Ikeda. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 8, no. 1, Feb. 1956, p. 9-13.

Magnesium can be determined in presence of large amounts of aluminum. (S11, Mg, Al)

396-S. (English.) **Studies on Gas Analysis in Metallic Titanium.** Hirdehiro Goto, Shin Suzuki and Akira Onuma. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 8, no. 1, Feb. 1956, p. 24-30.

Determination of hydrogen, oxygen and nitrogen in metallic titanium studied by vacuum fusion and chlorination methods. (S11, Ti)

397-S. (Czech.) **Quality of Razor Blades.** Mir. Korinek and F. Beran. *Strojirenstvi,* v. 6, no. 1, Jan. 1956, p. 39-44.

Manufacturing method, inspection, determination and control of quality. Study of sharpness and its geometry. Microstructure and microsmoothness.
(S15, S13, S12, M27, T6, ST)

398-S. (French.) **Determination of Lead Compounds.** R. Collee. *Ana-*

lytica Chimica Acta, v. 14, no. 5, May 1956, p. 430-438.

Method for quantitative determination of various lead compounds present in ores and metallurgical products. (S11, Pb)

399-S. (German.) **Quality Prediction of Smelted Cast Iron and Steel by Optical Temperature Measurements.** Kurt Orths. *Archiv für das Eisenhüttenwesen,* v. 27, no. 5, May 1956, p. 289-295.

Application of radiation analysis, thermal analysis, effect of various physical aspects on solidification, overheating limits. (S16, N12, CI)

400-S. (German.) **Specifications for Materials in Gas Turbines.** Boris Haas. *Archiv für das Eisenhüttenwesen,* v. 27, no. 5, May 1956, p. 311-316.

Relationship between the efficiency and gas-intake temperature. Stress on turbine wheels. Effect of temperature changes. (S22)

401-S. (German.) **Operational Principles of Electrical Instruments for Surface Measurement and Inspection.** F. Seeboth. *VDI Zeitschrift,* v. 98, no. 16, June 1956, p. 869-874.

Two types of electric pickups transforming mechanical vibrations into electric oscillations: with the needle itself producing electric pressure, and with the needle modulating the amplitude of the high-frequency current supplied by a special oscillator. (S15)

402-S. (Italian.) **Internal Electrolysis by Means of a Circulating Anolyte. Determination of Cu, Pb, Cd and Fe in the Residual Alloy.** P. Ippoliti and A. Buratti. *Alluminio,* v. 25, no. 5, May 1956, p. 231-233.

Successful determinations carried out in presence of magnesium, silicon, titanium and aluminum. (S11, Cu, Pb, Cd, Fe)

403-S. (Swedish.) **Records of Production and Defective Castings in Foundries.** *Gjuteriet,* v. 46, no. 5, May 1956, p. 65 + 6 pages.

Draft of a standard report form for production data and number and type of defectives was worked out from studies of forms from four different iron foundries. (S12, S13, E general, CI)

404-S. (Swedish.) **Magnetic Powder Testing as an Inspection Method at the Steel Works for Rolled and Forged Products.** Klas Erik Johansson. *Jernkontorets Annaler,* v. 140, no. 4, 1956, p. 227-264.

Reliability of magnetic powder methods, attempts to find a rapidly working device, advantages of pulsating direct current for running control, description of new apparatus. (S13, F22, F23, ST)

405-S. (Swedish.) **Combustion Furnace With High-Frequency Heating for Carbon and Sulphur Determination.** B. Elgh, G. Ericson and A. Wiman. *Jernkontorets Annaler,* v. 140, no. 5, 1956, p. 373-385.

Material in lump form may be analyzed by use of high-frequency combustion furnace. Rapid testing is possible as the furnace is instantly available. (S11)

406-S. Anion-Exchange Studies. XXI. Th(IV) and U(IV) in Hydrochloric Acid. Separation of Thorium, Protactinium and Uranium. Kurt A. Kraus, George E. Moore and Frederick Nelson. *American Chemical Society, Journal,* v. 78, June 20, 1956, p. 2692-2694. (S11, Th, Pa, U)

407-S. Tracing Profits With Atoms. Annesta R. Gardner. *Dun's Review and Modern Industry,* v. 68, July 1956, p. 35-39, 82-84.

Radioactive atoms are solving a host of problems in a wide range of industries. Some examples are given. (S19)

408-S. Automation and Machine-Control Gauging. W. C. Mullin. *Electrical Engineering,* v. 75, July 1956, p. 611-614.

Methods of gaging, recent utilization in production for maximum benefit. (S14)

409-S. Studies of Non-Destructive Testing. II. Dye Penetrant Inspection. III. Electrified Particle Inspection. Susumu Yoshida and Kiyoshi Tamura. *Journal of Mechanical Laboratory (Japan),* v. 1, 1955, p. 18-19.

Some standard prescriptions for penetrants and developers. Atmospheric humidity was found to have an important effect on results of electrified particle inspection. (S13)

410-S. Liquid-Liquid Extraction Procedures in Inorganic Analysis. A Review of Practical Applications With Particular Reference to Metallurgical Analysis. T. S. West. *Metallurgia,* v. 53, no. 320, June 1956, p. 292-294.

Extraction of Group V metals. (S11)

411-S. Coulometric Determination of Uranium (VI) at Controlled Potential. Glenn L. Booman, Wayne B. Holbrook and James E. Rein. *Phillips Petroleum Co., Idaho Operations Office (U. S. Atomic Energy Commission),* IDO-14369, May 1956, 7 p.

Uranium (VI) is reduced to uranium (IV) at a controlled-potential mercury cathode using a potassium citrate-aluminum sulfate or a sulfuric acid electrolyte. The method can tolerate mercury (II), copper (II), iron (III), and large amounts of nitric acid. (S11, U)

412-S. (English.) **Studies on Ball-Bearing Steel. II. Effect of Some Metallurgical Factors on the Life of Ball Bearings. III. Austenitizing Behavior of Acid Open Hearth Furnace Steels, Basic Electric Arc Furnace Steels and SKF Ball Bearing Steels.** Manabu Ueno, Tetsutaro Mitsuhashi and Yutaka Nakana. *Journal of Mechanical Laboratory (Japan),* v. 1, 1955, p. 62-64.

Effect of chemical composition, nonmetallic inclusions, compressive load of inner ring, cementite content, grain size and degree of forging on life of ball bearings. Solubility of cementite in the two types of steels. (S21, N8, ST)

413-S. Aluminum-Base Die-Casting Alloys. I-II. *American Machinist,* v. 100, July 16, 1956, p. 155, 157, 159.

Compositions and characteristics of both standard and special alloys, with a cross-reference chart. (S22)

414-S. Effect of Combustion-Resistant Hydraulic Fluids on Ball-Bearing Fatigue Life. H. V. Cordiano, E. P. Cochran, Jr., and R. J. Wolfe. *ASME, Transactions,* v. 78, July 1956, p. 989-993; disc., p. 994-996.

Phosphate ester, phosphate ester-base and water-glycol-base combustion-resistant fluids and a petroleum oil were investigated to determine relative effects when used as flood lubricants on the life of angular-contact ball bearings. (S21, Q7)

415-S. The Potentiometric Method for the Determination of Aluminum on a Semimicro Scale. J. R. McCallum. *Canadian Journal of Chemistry,* v. 34, July 1956, p. 915-920.

A technique whereby semimicro quantities of aluminum may be determined in the presence of relatively large amounts of iron with both accuracy and speed. (S11, Fe, Al)

416-S. Analysis for Small Amounts of Calcium, Magnesium, Barium, and Sulphate Using Phthalein Purple. J. R. McCallum. *Canadian Journal of Chemistry,* v. 34, July 1956, p. 921-925.

The sample is passed through a cation exchange column and washed with distilled water. This solution is boiled and precipitated with excess standard disodium ethylenediaminetetracetate in the presence of alcohol and ammonia using phthalein purple indicator. (S11, Ca, Mg, Ba)

417-S. Spectrophotometric Estimation of Uranium (VI) by Morellin. B. R. Lakshman Rao and C. C. Patel. *Indian Academy of Sciences, Proceedings,* v. 43, sec. A, May 1956, p. 276-285.

In ethanol medium, morellin and uranium form a reddish brown complex which is destroyed by acid or alkali. (S11, U)

418-S. Parts Inspection Via Camera & Chemicals. Bert Goldrath. *Industrial Photography,* v. 5, July 1956, p. 33,71.

Airline records results of tests for fatigue and other strain by photographing plane parts after oil-dye examination. (S13, Q9)

419-S. Selection and Applications of Spring Materials. *Materials & Methods,* v. 44, July 1956, p. 135, 137.

Data on characteristics, available sizes, application temperature and general properties. (To be continued.) (S22, SG-b, ST)

420-S. Failures of Forged End Bells on Large Electric Generators. *Metal Progress,* v. 70, July 1956, p. 65-72.

Forged austenitic steel rings at ends of rotor shafts on two 100,000-kw. generators in Toronto burst from over-stressing in the region of ventilation holes. (S21, Q25, AY)

421-S. Use of Tap Water in Magnetic Particle Inspection. J. L. McCabe and B. Hirst. *Metal Progress,* v. 70, July 1956, p. 77-79.

Tap water with suitable rust inhibitors and wetting and antifoaming agents may be substituted for the petroleum distillate. (S13)

422-S. Rapid Chemical Analysis With the X-Ray Spectrograph. A. M. Reith and E. D. Weisert. *Metal Progress,* v. 70, July 1956, p. 83-87.

Replaces wet chemistry techniques for routine determinations of difficult-to-handle elements. (S11)

423-S. How Steel Seams Are Detected and Measured. *SAE Journal,* v. 64, July 1956, p. 62-67.

Magnetic or eddy current techniques seem best. Ultrasonic and magnetic particle techniques discussed. (S13)

424-S. (English.) **Inorganic Analysis in Organic Solvents. I. Spectrophotometric Determination of Chromium**

Following a Chromatographic Separation. A. J. Blair and D. A. Pantony. *Analytica Chimica Acta,* v. 14, no. 6, June 1956, p. 545-552.

Method in which the 8-hydroxyquinaldate complexes of chromium are separated from those of most other metals by selective adsorption on activated alumina from organic solvents. (S11, Cr)

425-S. (English.) **A Precise Direct Heterometric Determination of Traces of Copper with Diethyldithiocarbamate in Excesses of Metals.** M. Bobtelsky and R. Rafailoff. *Analytica Chimica Acta,* v. 14, no. 6, June 1956, p. 558-567.

Investigates the most favorable conditions and the influence of complexing agents in the titration process. (S11, Cu)

426-S. (Czech.) **Surface Temperature Measurement of Materials by Thermo-Indicators.** Kazimir Pospiech. *Slévarenstvi,* v. 4, no. 6, June 1956, p. 191-195.

Development of chemical indicators, based on the change in color as well as the change of state. Properties, uses and evaluation of thermal chalks. (S16)

427-S. (Czech.) **Use of Radioactive Isotopes for Nondestructive Testing of Macrostructure of Materials at the K1.** Gottwald Ironworks. Oldrich Kozusnik. *Zvaranie,* v. 5, no. 5, May 1956, p. 146-150.

Use of cobalt-60 for testing castings for cracks, discontinuities, foreign particles, cavities, bubbles, cold shuts, poorly fused welds and porosity. Iridium-192, cesium-137, tantalum-182, and mesothorium have been considered. Comparison of X-ray and isotope testing. (S13, M28)

428-S. (French.) **Separation of Rb-Cs by Chromatography on Cellulose. Selective Extraction of Fission Cs^{137}.** J. Fouarge and G. Duyckaerts. *Analytica Chimica Acta,* v. 14, no. 6, June 1956, p. 527-537.

Separation of microquantities was accomplished successfully only by the use of a phenolic eluant. The method is effective for quantitatives up to "trace" amounts, and Cs^{137} "carrier free" was separated selectively, directly from a nitric solution of irradiated uranium.
(S11, U, Rb, Cs)

429-S. (French.) **Defining and Controlling the Quality of a Metal.** Marcel Prot. *Métaux, Corrosion-Industries,* v. 31, no. 369, May 1956, p. 214-218.

Describes three new French standards: NF X 05-020, (terminology of quality control of industrial products); NF X 06-011 (definition, choice, and specification of the quality of a metal): and NF X 06-012 (technical quality control methods for a metal). (S22, S12)

430-S. (German, French.) **Application of Ultrasonics in Light Metals Technology.** F. Rohner. *Aluminium Suisse,* v. 6, no. 3, May 1956, p. 82-89.

Principles and diversified uses of ultrasonics in the fabrication of light metals. (S13, EG-a)

431-S. (Hungarian.) **Rapid Methods for the Analysis of Aluminum. II. Rapid Photometric Determination of Vanadium With Sulfuric Acid.** *Kohaszati Lapok,* v. 9, no. 5, May 1956, p. 238-240.

(S11, Al, V)

432-S. (Spanish.) **Use of Flame Photometry in the Analysis of Some Elements Present in Ferrous Alloys.** Fernando Burriel Marti, Juan Ramirez and Maria del Carmen Asuncion Omarrementeria. *Instituto del Hierro y del Acero,* v. 9, no. 45, Apr. 1956, p. 417-424.

Study of cobalt, nickel, chromium, manganese and vanadium present in ferrous alloys.
(S11, Fe, Co, Ni, Mn, V)

433-S. The Direct Analysis of Uranium-Gallium Alloys. G. W. C. Milner. *Analyst,* v. 81, June 1956, p. 367-369.

Procedure avoids chemical separations; both constituents are determined by volumetric methods.
(S11, Ga, U)

434-S. Determination of Small Quantities of Nickel With α-Furildioxime. C. G. Taylor. *Analyst,* v. 81, June 1956, p. 369-371.

Analytical procedure. (S11, Ni)

435-S. The Photometric Determination of Silicon in Steels. T. R. Andrew and C. H. R. Gentry. *Analyst,* v. 81, June 1956, p. 339-348.

An improved method based on the molybdenum-blue reaction, a mixture of ferrous ammonium sulphate and oxalic acid being used for the reduction. (S11, Si, ST)

436-S. The Spectrophotometric Determination of the Alkaline-Earth Metals With Murexide, Eriochrome Black T and With o-Cresolphthalein Complexone. F. H. Pollard and J. V. Martin. *Analyst,* v. 81, June 1956, p. 348-353.

Absorptiometric methods suitable for the determination of microgram quantities of barium, strontium, calcium and magnesium discussed with reference to the determination of these metals when separated by paper chromatography. (S11, EG-f)

437-S. The Quantitative Analysis of the Alkaline-Earth Metals by Paper Chromatography. F. H. Pollard, J. F. W. McOmie and J. V. Martin. *Analyst,* v. 81, June 1956, p. 353-358 + 2 plates.

Erichrome black T and o-cresolphthalein complexone are used in conjunction with a paper-chromatographic separation for the determination of microgram quantities of barium, strontium, calcium and magnesium in synthetic mixtures and in minerals. (S11, EG-f)

438-S. Cutting Tools and Radioisotopes. Use of Radioactive Tracer Elements in Determining Cutting-Tool Life. *Atomics (British),* v. 7, July 1956, p. 229-232, 247.

Isotopes are used to assess tool wear and evaluate cutting coolants in relation to tool life. (S19, Q9, G21, T6)

439-S. Measurement of Thorium in Ores by the Thorium Emanation Method. J. B. Zimmerman and J. A. F. Bouvier. *Canada, Department of Mines and Technical Surveys, Mines Branch Technical Paper* No. 14, 1955, 21 p.

A flow counter for determining the thorium content of ores in secular equilibrium. Scintillations produced in a zinc sulphide phosphor by alpha particles resulting from the disintegration of thoron detected by a photomultiplier tube and registered by a standard scaling unit. (S11, Th)

440-S. The Determination of Thorium by Proportional Counting of Thoron. W. B. Silker. *Hanford Atomic Products Operation (U. S. Atomic Energy Commission),* HW-32436, Rev., Apr. 1956, 14 p.

A method for the determination of microgram amounts of thorium by proportional counting of thoron, which is continuously purged from a sample in solution by a stream of argon. Optimum flow rate, counter characteristics and the proportional counter used. (S11)

441-S. Suction Pyrometry. T. Land. *Instruments and Automation,* v. 29, July 1956, p. 1314-1320.

Device protects gas from radiant heat transfer to or from surrounding walls. (S16)

442-S. Radio-Active Isotopes for Testing Cutting Tools and Cutting Fluids. *Machinery Lloyd (Overseas Ed.),* v. 28, July 7, 1956, p. 79-80.

Studies were made with irradiated Wimet X8 tungsten carbide consisting of 77% tungsten carbide, 8% cobalt and 15% titanium carbide. (S19, G21, C-n, W)

443-S. Measurement and Control of the Temperature of Moving Parts. II. D. A. Senior. *Machinery Lloyd (Overseas Ed.),* v. 28, July 7, 1956, p. 81-83, 85.

Theory and application of the bolometer, thermopile and the lead sulphide cell. (To be continued.) (S16)

444-S. Mercer's Air-Gauge Approach to Automatic Inspection. D. J. Weatherby. *Metalworking Production,* v. 100, July 6, 1956, p. 1025-1028.

Requirements for dimensional inspection of quantity produced parts; operating principles of pneumatic gaging; advantages. (S14)

445-S. Quality Control Charts Plating Savings. Guy J. Campbell. *Steel,* v. 139, July 23, 1956, p. 90, 92.

Examples of charts for operational control. (S12, L17)

446-S. Functional Gaging Cuts Production and Inspection Costs. W. A. Brillhart. *Tool Engineer,* v. 37, Aug. 1956, p. 88-92.

Study of the function of a part before gaging results in elimination of tolerance buildup, simplified tooling and gaging, greater latitude in machining and helps to cut part costs. (S14)

447-S. Surface Finish Inspection Methods. C. H. Good. *Tool Engineer,* v. 37, Aug. 1956, p. 93-97.

A survey of techniques for the evaluation and measurement of surface quality. (S15)

448-S. The Determination of Uranium in Ores: Separation by Ethyl Acetate Extraction and Spectrophotometric Determination by the Thiocyanate Method in Acetone-Water Medium. H. I. Feinstein. *U. S. Atomic Energy Commission, TEI-555,* Sept. 1955, 16 p.

Reasonable control of acidity and thiocyanate concentration eliminates the erratic results that are sometimes obtained by thiocyanate methods. The use of the extraction procedure permits the determination of uranium in vanadium-bearing ores, minerals and rocks. An accuracy of ± 2% of the accepted value can be readily achieved. (S11, U)

449-S. Precision Spring Manufacture Employing Electronic Controls. H. H. Passolt. *Wire and Wire Products,* v. 31, July 1956, p. 777-778, 814.

Electronic quality control in spring design and uniformity of size. (S12, S14, SG-b)

450-S. (English.) **International Conference on Non-Destructive Methods for the Investigation and Testing of Materials.** Y. Verwilst. *Acier, Stahl, Steel,* v. 21, no. 6, June 1956, p. 255-258.

Equipment for radiographic, supersonic and magnetic testing reviewed. (S13)

451-S. (English.) **On the Accuracy of Strain Determination by Brittle Coatings.** Toshio Nishihara, Shuji Taira and Haruoki Maeda. *Kyoto University, Engineering Research Institute Technical Reports,* v. 6, no. 1, Feb. 1956, 12 p.

For the three cases considered, the crack pattern of the coating does not accurately show the strain distribution. Corrections were determined. (S13)

452-S. (French.) **Spectrophotometric Analysis of Aluminum in Copper Alloys.** Charles Dozinel. *Chimie Analytique,* v. 38, no. 7, July 1956, p. 244-249.

A method of determining directly 0.01 to 10% quantities of aluminum in copper alloys by using thioglycolic acid in its ammonium salt form to insure the proper pH. (S11, Al, Cu)

453-S. (French.) **A Note About Determining Traces of Aluminum in Steels.** R. Rosotte. *Chimie Analytique,* v. 38, no. 7, July 1956, p. 250-252.

Measurement of light absorption in a suspension of aluminum salt of cupferron at pH 3.9 after eliminating residual iron using a mercury cathode. The method may be used to detect proportions as low as 0.2γ per cu. cm. by nephelometry. (S11, Al, ST)

454-S. (French.) **A Note About the Potentiometric Analysis of Chromium and Vanadium in Steels.** J. Silvestre and M. F. Hurth. *Chimie Analytique,* v. 38, no. 7, July 1956, p. 253-257.

Analytical procedure includes the preliminary oxidation of vanadium and chromium by a perchloric method. Method of dealing with tungsten which may interfere. (S11, Cr, V, ST)

455-S. (French.) **Applications to Iron and Steel Research of the Electronic Probe Microanalyzer.** J. Philibert and C. Crussard. *Revue de Métallurgie,* v. 53, no. 6, June 1956, p. 461-470.

Apparatus allows a rapid elementary analysis of elements with an atomic number greater than 17, with a 1% accuracy. (S11, Fe)

456-S. (German.) **On the Quantitative Analysis of Titanium. I.** P. Wehber, W. Johannsen and M. Heydecke. *Metall,* v. 10, no. 13-14, July 1956, p. 636-639.

Theory of redox reactions, description of a simplified amalgam reductor, simultaneous determination of titanium and iron and analysis of technical products. (S11, Fe, Ti)

457-S. (Russian.) **Determination of Zirconium in Alloys by the Radiometric Titration Method.** I. P. Alimarin and I. M. Gibalo. *Zavodskaia Laboratoriia,* v. 22, no. 6, June 1956, p. 635-636.

Procedures of zirconium determination in pure solutions and in alloys in the presence of other elements, by radiometric titration with phosphoric acid. (S11, Zr)

458-S. (Russian.) **Separation of Tantalum From Titanium by Extraction.** Iu. A. Chernikhov, R. S. Tramm and K. S. Pevzner. *Zavodskaia Laboratoriia,* v. 22, no. 6, June 1956, p. 637-639.

Separation by treating the mixture with hydrofluoric acid and extracting tantalum fluoride with the aid of cyclohexanone; advantages of method. (S11, B14, Ta, Ti)

459-S. (Russian.) **On the Procedures of Photocolorimetric Determination of Cobalt With Nitroso-R Salt.** D. N. Finkel'shtein. *Zavodskaia Laboritoriia,* v. 22, no. 6, June 1956, p. 648-650.

Several improvements on the method suggested. (S11, Co)

460-S. (Russian.) **Spectral Analysis of Titanium and Its Alloys for Nitrogen, Hydrogen and Oxygen.** N. S. Sventitskii, K. A. Sukhenko, P. P. Galonov, O. B. Fal'kova, M. S. Alpatov and K. I. Taganov. *Zavodskaia Laboratoriia,* v. 22, no. 6, June 1956, p. 668-673.

An original spectral method of quantitatively determining nitrogen, oxygen and hydrogen in titanium alloys and hydrogen in titanium powder. (S11, Ti)

461-S. (Russian.) **Extractional Separation of Niobium, Tantalum and Titanium.** *Zhurnal Analiticheskoi Khimii,* v. 11, no. 3, May 1956, p. 269-277.

Extraction in the form of pyrocatechin complex compounds is possible with *n*-butanol, depending on the pH of the oxalate solution. (S11, Cb, Ti, Ta)

462-S. (Russian.) **Isolation of Magnesium, Aluminum, Chromium, Manganese, Iron, Nickel and Copper by Ion-Exchange Methods.** D. I. Riabtshikov and V. F. Osipova. *Zhurnal Analiticheskoi Khimii,* v. 11, no. 3, May 1956, p. 278-285.

Reactions with thiosulfate, rhodanides and pyrophosphates are used. (S11)

463-S. (Russian.) **Colorimetric Determination of Copper Traces in Metallic**

Nickel and Its Compounds in the Ultraviolet Spectrum Field. K. P. Stoliarov and F. B. Agrest. *Zhurnal Analiticheskoi Khimii,* v. 11, no. 3, May 1956, p. 286-291.

Method is based on the adsorption of rays with a wave length of 365-380 mu by an ammoniabromide complex of monovalent copper. (S11, Cu, Ni)

464-S. (Russian.) **A New Semi-Microgravimetric Method of Copper Determination. II. Application of a β-Oxynaphthoic Aldehyde in Analytical Chemistry.** S. I. Gusev and V. I. Kumov. *Zhurnal Analiticheskoi Khimii,* v. 11, no. 3, May 1956, p. 303-306.

Determination of copper in alloys and minerals in the form of $C_{22}H_{14}O_4$ Cu. (S11, Cu)

465-S. (Russian.) **Kinetic Methods of Quantitative Analysis. III. Determination of Small Amounts of Molybdenum.** K. B. Yatsimirski and L. P. Afanassieva. *Zhurnal Analiticheskoi Khimii,* v. 11, no. 3, May 1956, p. 319-322.

Determination is based on utilization of iodide oxidation reaction with hydrogen peroxide. (S11, Mo)

466-S. (Russian.) **A Method for Concentrating Copper Traces by the Use of Organic Reagents.** V. T. Tshuiko and A. U. Mamenko. *Zhurnal Analiticheskoi Khimii,* v. 11, no. 3, May 1956, p. 332-336.

Rapid determination methods for copper admixtures in lead, cadmium, nickel and cobalt salts. (S11, Cu)

467-S. (Russian.) **On Lead Detection in Ores by the Grinding Method.** E. P. Oshigov, M. A. Rafienko and L. K. Ivanenko. *Zhurnal Analiticheskoi Khimii,* v. 11, no. 3, May 1956, p. 361-362.

Lead detection by means of potassium iodide using the grinding method with preheating in the last stage shows high specificity and sensitivity. (S11, Pb)

468-S. Brass and Magnesium Die Castings. *American Machinist,* v. 100, July 30, 1956, p. 123.

Compositions and properties. (S22, Cu, Mg)

469-S. Photometric Determination of Germanium With Phenylfluorone. C. L. Luke and Mary E. Campbell. *Analytical Chemistry,* v. 28, Aug. 1956, p. 1273-1276.

Microgram quantities of germanium are determined by isolation with carbon tetrachloride. (S11, Ge)

470-S. Photometric Determination of Tin With Phenylfluorone. Determination of Tin in Lead and 1% Antimony-Lead Alloys. C. L. Luke. *Analytical Chemistry,* v. 28, Aug. 1956, p. 1276-1279.

Microgram quantities of tin are isolated by a carbamate-chloroform extraction. (S11, Pb, Sn)

471-S. Rapid Polarographic Determination of Uranium in Nonaqueous Solvents. D. J. Fisher and P. F. Thomason. *Analytical Chemistry,* v. 28, Aug. 1956, p. 1285-1288.

Well-formed uranium waves are obtained in several nonaqueous media with standard polarographic apparatus. (S11, U)

472-S. Determination of Platinum and Palladium in Ferronickel Assay Buttons. H. G. Coburn, F. E. Beamish and C. L. Lewis. *Analytical Chemistry,* v. 28, Aug. 1956, p. 1297-1300.

Isolation of platinum and palladium from large proportions of iron, nickel and copper was accomplished by cation exchange. (S11, Pt, Pd)

473-S. Ion Exchange-Spectrophotometric Determination of Aluminum. A. D. Horton and P. F. Thomason. *Analytical Chemistry,* v. 28, Aug. 1956, p. 1326-1329.

Aluminum was separated from interferring metal ions by a strongly basic ion exchange resin. Effluent aluminum was determined as the ammonium aurintricarboxylate lake. (S11, Al)

474-S. Determination of Cerium and Chromium in Cerium-Chromium-Uranium Mixtures. Charles V. Banks and Jerome W. O'Laughlin. *Analytical Chemistry,* v. 28, Aug. 1956, p. 1338-1340.

Preferentially oxidized chromium is determined titrimetrically, and cerium is determined, together with chromium, in another sample portion. (S11, Ce, Cr)

475-S. Determination of Traces of Gallium and Indium in Germanium and Germanium Dioxide. C. L. Luke and Mary E. Campbell. *Analytical Chemistry,* v. 28, Aug. 1956, p. 1340-1342.

Photometric determination of 1 to 10 p.p.m. of gallium or indium. (S11, Ga, In, Ge)

476-S. Two New Total Radiation Pyrometers. W. Derganc and S. N. Howell. *Communication and Electronics,* July 1956, p. 360-367.

Design of instruments capable of measuring the temperature of moving material in process. (S16)

477-S. Determination of Low Carbon Contents in Steel. *Iron and Steel*

Institute, Journal, v. 183, July 1956, p. 287-299.

Gravimetric, titrimetric, pneumatic and conductimetric methods for the measurement of carbon dioxide evaluated. (S11, CN)

478-S. Finishing Supplement: Quality Control Applied to Plating. Guy J. Campbell. *Metal Industry,* v. 89, July 13, 1956, p. 27-29.

Charts used to control plating solutions. (S12, L17)

479-S. A Magneto-Electric Method for Detecting Defects in Cast Aluminium Rotor Windings for Squirrel-Cage Motors. A. M. Armour and J. W. Walley. *Metallurgia,* v. 54, no. 321, July 1956, p. 43-46.

The method involves turning the rotor slowly at a steady speed in a steady magnetic field and noting any variations in the cross-field due to the induced current: variations indicate defects in the casting. (S13, Al)

480-S. Liquid-Liquid Extraction Procedures in Inorganic Analysis. A Review of Practical Applications With Particular Reference to Metallurgical Analysis. T. S. West. *Metallurgia,* v. 54, no. 321, July 1956, p. 47-51.

Covers extraction of Group VIa, VIIa and the transition metals. (S11)

481-S. (English.) **The Separation of Rhodium and Iridium on a Microscale.** A. D. Westland and F. E. Beamish. *Mikrochimica Acta,* 1956, no. 10, p. 1474-1480.

Rhodium is displaced from a boiling, dilute sulfuric acid solution by antimony dust. Antimony is separated from iridium by distilling the former as the trichloride after which the iridium is determined with *p*-nitrosodimethylaniline. (S11, Ir, Rh)

482-S. Aluminum Base Alloy Die Castings. *Precision Metal Molding,* v. 14, Aug. 1956, p. 49-50.

Composition, properties and characteristics of standard and special alloys. (S22, E13, Al)

483-S. New Way to Check Trace Elements in Zinc. *Precision Metal Molding,* v. 14, Aug. 1956, p. 55, 77.

Technique involves electrolysis at controlled potential. (S11, Zn)

484-S. Selecting Copper and Copper-Base Alloys. II. *Welding Engineer,* v. 41, Aug. 1956, p. 53.

Properties of alloys tabulated. (S22, Cu)

485-S. (French.) **Nondestructive Testing of Metals by Ultrasonics.** M. Palmé. *Corrosion et Anticorrosion,* v. 4, no. 5, June 1956, p. 195-210.

General principles, acoustic impedance, quartz, barium titanate and lithium sulfate transducers, and methods of use. (S13)

486-S. (French.) **Nondestructive Testing of Metals by Gamma-Radiography.** Albert Blondel. *Fonderie,* no. 125, June 1956, p. 213-222.

Various isotopes and considerations regarding their choice. The law of absorption of irradiation by metals and mechanism of absorption. Various factors influencing quality of the image. (S13)

487-S. (German.) **Photometric Determination of Cobalt With the Aid of Alkali Rhodanide and Tri-n-butyl Ammonium Salt.** Max Ziegler, O. Glemser and E. Preisler. *Angewandte Chemie,* v. 68, no. 13, July 1956, p. 436-437.

Cobalt is precipitated as blue tri-n-butyl ammonium-rhodano-cobaltate (II) and extracted with amyl alcohol. (S11, Co)

488-S. (German.) **The Photometric Microdetermination of Cobalt as a Tributylammoniumrhodanide.** Max Ziegler, Oskar Glemser and Eberhard Preisler. *Mikrochimica Acta,* 1956, no. 10, p. 1526-1530.

Rapid process permits accurate determination of cobalt in steel. (S11, Co, ST)

489-S. (German.) **Testing of Metal-Sprayed Sleeve Bearings.** E. Kretzschmar. *Technik,* v. 11, no. 6, June 1956, p. 435-442.

A survey of past methods of testing metal-sprayed sleeve bearings. Some recent experiments with simultaneous spraying of bearings with metals and graphite and on testing of working properties and wear resistance of bearings; equipment used. (S21, Q9, L23)

490-S. (German.) **Ultrasonic Industrial Testing Method for Fine Metal Sheets.** H. Beuse and H. Hartwig. *VDI Zeitschrift,* v. 98, no. 20, July 1956, p. 1057-1061.

Detection of inclusions and their size and location on an industrial scale. (S13)

491-S. (German.) **Carbon in Nonferrous Metals. IV. Carbon Content in Zinc and Zinc Alloys.** J. Fischer and W. Schmidt. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 9, no. 7, July 1956, p. 322-323.

A method of testing zinc for carbon, some experimental results. (S11, Zn)

492-S. (Polish.) **The Application of Radioactive Isotopes in Metallurgy.** Andrezej Staronka. *Hutnik,* v. 23, no. 4, Apr. 1956, p. 154-162.

Uses of radioactive isotopes for testing during the concentration of ores, for measuring gas currents in blast furnaces, for studying carbon in coke, linings of blast furnaces, reduction of metallic oxides by carbon, oxidation of metals, and corrosion and use in analytical chemistry. (S19, D1, B14, R2)

493-S. (Polish.) **Radioactive-Isotopic Inspection.** Tadeusz Florkowski. *Hutnik,* v. 23, no. 4, Apr. 1956, p. 167-172.

Principles of using isotopes, uses of the photographic method and the ionization method, safety considerations. (S19, Co, Ta, Cs, Se, Ir, Tm)

494-S. (Polish.) **Nondestructive Methods of Testing Materials in Industry and Mining.** Ignacy Malocki. *Przeglad Techniczny,* v. 77, June 1956, p. 247-251.

General discussion of X-ray, gamma ray, ultrasonic and magnetic testing of materials. State of the art in Poland. Apparatus and methods. Use in testing insulation for high voltages and for studying formations in mining. (S13)

495-S. (Russian.) **Ultrasonic Control of Welding Joints.** N. V. Khimchenko and V. P. Esilevskii. *Svarochnoe Proizvodstvo,* no. 7, July 1956, p. 18-22.

Detection of flow in welded steel joints by different methods of defect detection. (S18, K general, ST)

496-S. (Book.) **Elements of Quantitative Analysis.** Hobart H. Willard, N. Howell Furman, and Clark E. Bricker. 4th Ed. 576 p. 1956. D. Van Nostrand Company, Inc., 120 Alexander St., Princeton, N. J. $5.85.

Text includes theory, applications, and laboratory experiments, using new and improved techniques. (S11)

497-S. (Book.) **Fundamentals of Qualitative Chemical Analysis. Semimicro Method.** Roy K. McAlpine and Byron A. Soule. 4th Ed. 340 p. 1956. D. Van Nostrand Company, Inc., 120 Alexander St., Princeton, N. J. $5.00.

A basic text outlining semimicro analytical procedures for a number of common metals and acid radicals, and the principles involved. (S11)

498-S. (Book—German.) **Spectrochemical Industrial Analysis. v. XLIII. Chemical Analysis.** Heinrich Moritz. 2nd Ed. 240 p. 1956. Ferdinand Enke, Stuttgart, Germany.

Textbook includes equipment and analytical procedures for qualitative and quantitative analysis of ores, minerals, and slags. (S11)

499-S. The Nitroso-R Salt Method for the Determination of Cobalt in Ores. B. D. Guerin. *Analyst,* v. 81, July 1956, p. 409-416.

Use of the differential technique of color measurement permits up to 3% cobalt to be determined directly in a 0.2-g. sample, without recourse to chemical separations. The effects of iron, copper and nickel. (S11, Co)

500-S. Foundry Practice. XII. Quality Control. William H. Salmon and Eric N. Simons. *Edgar Allen News,* v. 35, July 1956, p. 148-149.

Control in melting, heat treatment and fettling procedures and in final inspection. (To be continued.) (S12, E10, J23)

501-S. An Optical Method of Flame Temperature Measurement. I. Theory. F. J. Weinberg. **II. Sensitivity and Applications.** J. Reck, K. Sumi and F. J. Weinberg. *Fuel,* v. 35, July 1956, p. 359-369.

Parallel light confined by a narrow slit traverses a flame and gives rise to a curved image of the slit on a photographic plate. The area confined between the image and the straight line from which it deviates is correlated with the final flame temperature and other flame parameters. (S16)

502-S. The Routine Determination of the Hydrogen Content of Aluminium and Aluminium Alloys by the Hot-Extraction Method. C. E. Ransley and D. E. J. Talbot. *Institute of Metals, Journal,* v. 84, July 1956, p. 445-452 + 1 plate.

Apparatus and procedures. (S11, Al)

503-S. The Use of Electrical Eddy Currents for the Study of Surface Layers. A. P. H. Jennings. *Iron and Steel Institute, Journal,* v. 183, Aug. 1956, p. 415-421.

Study of physical properties and the measurement of coating thickness, particularly that of tin on steel. (S13, S14, P general, Sn, ST)

504-S. Slip Gauge Calibration. F. O. Hutchinson. *Machinery,* v. 89, July 1956, p. 163-167.

Inspection techniques, calibration procedure, precautions necessary with carbide gages. (S13, S14)

505-S. A Comparison Between British En. and American SAE Steels. W. B. Kemmish. *Machinery,* v. 89, July 1956, p. 167-168 + 4 plates.

Tabulated data on chemical compositions and mechanical and physical properties. (S22, Q general, P general, ST)

506-S. Analytical Determination of Trace Constituents in Metal Finishing Effluents. XVI. The Colorimetric Determination of Total and Free Cyanides. E. J. Serfass and R. F. Muraca. *Plating,* v. 43, Aug. 1956, p. 1027-1030.

Method uses a distillation procedure for concentrating and removing the cyanide from either simple or complex cyanides by refluxing the sample with dilute sulfuric acid and cuprous chloride. (S11, L17)

507-S. Determination of Traces of Thorium in Uranium Solutions. Myron O. Fulda. *U. S. Atomic Energy Commission, Research and Development Report,* DP-165, June 1956, 10 p.

A colorimetric method using thorium as the indicator. (S11, Th, U)

508-S. Determination of Trivalent Chromium in the Presence of Chromate. R. W. Cline, R. E. Simmons, and W. R. Rossmassler. *U. S. Atomic Energy Commission, Research and Development Report,* KY-173, July 1956, 6 p.

Trivalent chromium is separated from chromate by precipitating with ammonium hydroxide using aluminum hydroxide as a carrier. (S11, Cr)

509-S. Determination of Cementite (in Steel) in Presence of Vanadium and Molybdenum Carbides. N. M. Popova, A. F. Platonova and L. V. Zaslavskaya. *Henry Brutcher, Translation No.* 3727, 6 p. (Abridged from *Zavodskaya Laboratoriya,* v. 21, no. 1, 1955, p. 22-24.) Henry Brutcher, Altadena, Calif.

In anodic solution, cementite is left undissolved while the vanadium and molybdenum carbides are decomposed into products soluble in excess of alcoholic hydrogen peroxide. (S11, ST)

510-S. Magnetographic Method of Inspection of Welds. A. S. Fal'kevich, F. I. Kislyuk, Yu. V. Usenko and V. M. Lubov. *Henry Brutcher, Translation No.* 3729, 10 p. (Abridged from *Svarochnoe Proizvodstvo,* no. 7, 1955, p. 10-12.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 216-S, 1955. (S13, K9)

511-S. Colorimetric Determination of Aluminum With 'Arsenazo'. V. I. Kuznetsov and R. B. Golubtsova. *Henry Brutcher, Translation No.* 3739, 10 p. (From *Zavodskaya Laboratoriya,* v. 21, no. 12, 1955, p. 1422-1426.) Henry Brutcher, Altadena, Calif.

Nature, structure and properties of 'arsenazo', and control of interfering elements. (S11, Al)

512-S. Determination of Manganese Oxides and Sulfides in Carbon Steels and Their Separation From Manganese Carbides. N. F. Leve and A. B. Gurevich. *Henry Brutcher, Translation No.* 3762, 9 p. (From *Zavodskaya Laboratoriya,* v. 21, no. 9, 1955, p. 1032-1035.) Henry Brutcher, Altadena, Calif.

Determination of sulfidic manganese and of "unstable" and "stable" oxidic manganese in the residues. (S11, CN)

513-S. (English.) **Spectrophotometric Determination of Micro Quantities of Titanium With 8-Hydroxyquinaldine.** Kenji Motojima. *Chemical Society of Japan, Bulletin,* v. 29, no. 4, June 1956, p. 455-458.

Apparatus and procedures. (S11, Ti)

514-S. (English.) **Spectrophotometric Determination of Micro Quantities of Iron, Titanium and Aluminum When They Accompany Each Other. Use of 8-Hydroxyquinaldine and Oxine.** Kenji Motojima and Hiroshi Hashitani. *Chemical Society of Japan, Bulletin,* v. 29, no. 4, June 1956, p. 458-460.

Apparatus and procedures. (S11, Fe, Ti, Al)

515-S. Development of Automatic Thickness Control for Tandem Cold Reduction Mills. I. Application. H. S. Maxwell. **II. Design.** M. W. Cannon. **III. Results.** R. W. Holman. *Iron and Steel Engineer,* v. 33, Aug. 1956, p. 132-140.

Automatic thickness control means more uniform quality, equipment has advantages and reliability of transistors, manual control is reduced to a minimum and quality is less subject to human variation. (S14, F23)

516-S. The Spectrographic Analysis of Zirconium and Hafnium. D. A. Del Grosso and F. P. Landis. *Knolls Atomic Power Laboratory (U. S. Atomic Energy Commission),* KAPL-1539, May 1956, 52 p.

Spectrographic methods for determination of 31 metallic impurities in zirconium, zirconium alloys and hafnium. High-amperage direct-current arc method is used for hafnium-zirconium ratios, and two carrier-distillation direct-current arc methods are used for most other impurities. (S11, Sn)

517-S. A Non-Destructive Microchemical Method of Sorting Steels. W. R. Nall and R. Scholey. *Metallurgia,* v. 54, no. 322, Aug. 1956, p. 97-102.

A microchemical procedure uses simple, inexpensive apparatus. Clas-

sification of unknown steels is based on the estimation of manganese, nickel, chromium and molybdenum. A small number of analyzed steels are used as standards for comparison purposes. (S10, ST)

518-S. Ultrasonic Testing by Immersion Method. J. B. Morgan. *Steel,* v. 139, Aug. 27, 1956, p. 94-96, 98.

Technique lends itself to rapid inspection of regularly shaped objects, but is flexible enough to permit inspection of many complex shapes. (S13)

519-S. Fractures in Service. E. K. N. Nambiar. *Tisco,* v. 3, July 1956, p. 153-162.

Simple overload fractures, fatigue fractures and sources of stress-raisers, effect of temperature on fracture, influence of corrosion, example of service failure investigation. (S21, Q26)

520-S. The Significance of Test Results on Steels in Relation to Performance and to Specifications. E. H. Bucknall. *Tisco,* v. 3, July 1956, p. 163-172.

Distinction between test results and properties. Factors to be considered in choosing steels for various applications. Specifications of properties and methods of determining them. (S22, ST)

521-S. (English.) **Diallyldithiocarbamido-Hydrazine as an Analytical Reagent. I. Determination of Copper, Nickel, Zinc, and Lead and Separations of Their Binary Mixtures.** N. K. Dutt and K. P. Sen Sarma. *Analytica Chimica Acta,* v. 15, no. 1, July 1956, p. 21-24.

These metals are precipitated quantitatively from their solutions under controlled pH values. Complexes have definite compositions and are capable of being directly weighed in a tared crucible. (S11, Cu, Ni, Zn, Pb)

522-S. (Czech.) **Use of Radio-Isotopes in the Foundry.** Jaroslav Ruzicka. *Slévarenstvi,* v. 4, no. 7, July 1956, p. 218-222.

Used as simple emission sources or as indicators of stable elements. (S19, E general)

523-S. (French.) **The Use of Measuring Devices in Steelmaking.** G. Husson and P. Leroy. *Revue de Métallurgie,* v. 53, no. 7, July 1956, p. 554-565.

Devices developed to improve the thermal regularity, blast conditions and precision in starting and stopping operations. (S18, D1, ST)

524-S. (German.) **Investigations of Strain Hardened, Low-Carbon, Manganiferrous Structural Steels After Annealing. I. Technology and Strength Determination.** Friedrich Erdmann-Jesnitizer. *Neue Hütte,* v. 1, no. 7, July 1956, p. 400-413.

Examples of service failures as a result of strain aging. Effects of cold rolling and solidification, hardness behavior of cold rolled and nonrolled materials after annealing. (S21, N7, N12, Q29, AY)

525-S. (German.) **Utilization of Radioactive Isotopes in Metallurgy and Metallography.** A. Hentsch. *Neue Hütte,* v. 1, no. 7, July 1956, p. 413-419.

Applications such as testing blast furnace linings or determining diffusion velocities. Possible uses in powder metal technology. (S19)

526-S. Determination of Iron in Titanium Sponge, Alloys, and Ores. Howard V. Malmstadt and Charles B. Roberts. *Analytical Chemistry,* v. 28, Sept. 1956, p. 1412-1416.

Automatic derivative spectrophotometric titration with electrolytically generated titanous ion. (S11, Ti, Fe)

527-S. Direct Photometric Determination of Aluminum in Iron Ores. Uno T. Hill. *Analytical Chemistry,* v. 28, Sept. 1956, p. 1419-1424.

Specific spectrophotometric method described is fast, direct and accurate. When measured in a narrow-band instrument, the complex obeys Beer's law up to 10% aluminum or higher. (S11, Al)

528-S. Rapid Photometric Determination of Magnesium in Electronic Nickel. C. L. Luke. *Analytical Chemistry,* v. 28, Sept. 1956, p. 1443-1445.

Oxine method was modified for rapid determinations. Eliminated interfering metals with an ammonium hydroxide separation and by masking others with cyanide. (S11, Mg, Ni)

529-S. Effect of Iron on Determination of Tin in Brass and Bronze. Application of Radioisotope Techniques. C. N. LaRosa, Isadore Geld, Arthur Ticker, S. F. Di Lauro and J. L. Kalinsky. *Analytical Chemistry,* v. 28, Sept. 1956, p. 1447-1451.

Quantitative evaluation of the effect of iron on the nitric acid precipitation of tin. Two digestion temperatures were studied, with iron-59 and tin-113 used as tracers. (S11, Fe, Cu, Sn)

530-S. Statistical Control of Brass Foundry Scrap. Harry St. John. *Foundry,* v. 84, Sept. 1956, p. 114-117.

Use of statistical records to re-

duce brass casting scrap to as little as record costs can justify. (S12, A8)

531-S. (Czech.) **The Influence of Method of Preparing Specimens and of the Size of Their Surfaces on the Determination of Hydrogen in Aluminum by the Vacuum Fusion Method.** Lubos Kopa. *Hutnické Listy,* v. 11, no. 8, Aug. 1956, p. 467-472.

Separate determination of surface and interior hydrogen contents. (S11, A1)

532-S. (Italian.) **The Radiography of Iron, Steel and Light Alloy Castings.** Oscar Grossi, *Fonderia,* v. 5, no. 7, July 1956, p. 337-352.

Radiographic technique, interpretation of X-rays, identification of defects. (S13, CI, EG-a)

533-S. (Polish.) **Ultrasonic and Metallographic Testing of 2000-KW. Generator Rotors.** Mieczyslaw Kurek and Tadeusz Terlecki. *Hutnik,* v. 23, no. 7-8, July-Aug. 1956, p. 294-299.

Locating defects not visible to the naked eye. Methods applied to two large rotors, and the defects uncovered. Ultrasonic tests made with Hughes type MK III equipment. (S13, M21, ST)

534-S. (Polish.) **Testing Metals With Ultrasonic Surface Waves.** Jozef Tabin and Miecyslaw Kurek. *Hutnik,* v. 23, no. 7-8, July-Aug. 1956, p. 300-304.

Types of ultrasonic waves, methods of using them. Surface waves for defect detection, examples of use. (S13)

535-S. (Polish.) **Use of Radioactive Isotopes for Defect Detection.** *Przeglad Techniczny,* v. 77, July 1956, p. 303-308.

An introduction to the possibilities and methods of using gamma radiation for improving the quality of metal products. (S13)

536-S. Analysis of Nickel in Plating Baths. Frank Brako. *Metal Finishing,* v. 54, Sept. 1956, p. 61-64.

"Sodium cyanide-murexide" method is simple, direct and accurate, as well as rapid. (S11, L17, Ni)

537-S. Checking the Wall Thickness of Hollow Steel Shafts by the Multiple-Back-Reflection Immersion Method. J. Koziarski. *Nondestructive Testing,* v. 14, July-Aug. 1956, p. 12-15.

Requirements for checking, equipment design and development, use of ultrasonic field kit. (S14, ST)

538-S. Influence of Geometry Upon an Ultrasonic Defect-Size Determination in Large Rotor Forgings. Steven Serabian. *Nondestructive Testing,* v. 14, July-Aug. 1956, p. 18-21.

In correlation of defect size with magnitude of ultrasonic indications, corrections due to defect orientation and forging geometry can be appreciable. (S13)

539-S. The State of Ultrasonic Testing in Germany and the Application of This Method by the German Federal Railways. Erich Martin. *Nondestructive Testing,* v. 14, July-Aug. 1956, p. 26-31.

Flaw detection, by impulse echo method, used on wheels, axles and wheel seats to locate cracks. (S13)

540-S. Iridium-192 Proves Useful Inspection Tool in the Aircraft Industry. Clive Yeomans and Stephen Bellanca. *Nondestructive Testing,* v. 14, July-Aug. 1956, p. 32, 34.

Radiographic X-ray tests, using new lower energy isotope for examination of a variety of thin, low-density materials. (S13, Ir)

541-S. Quality Control in a Pipe Mill. James A. Curry. *Steel,* v. 139, Sept. 10, 1956, p. 148, 150, 152, 156.

Cold, flat skelp is continuously welded into pipe by the electric resistance method, visually and magnetically inspected, and hydrostatically and crush tested. (S12, F26, ST)

542-S. Ultrasonics and Its Applications. S. Ya. Sokolov. *Henry Brutcher Translation No.* 3532, 20 p. (From *Priroda,* v. 43, no. 3, 1954, p. 21-34.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 283-S, 1954. (S13, P10)

543-S. Ultrasonic Detection of Flaws in Forgings. D. P. Valuev, R. N. Il'ina, B. N. Masharskii and P. D. Khinskii. *Henry Brutcher Translation No.* 3685, 5 p. (From *Vestnik Mashinostroeniya,* v. 34, no. 11, 1954, p. 63-64.) Henry Brutcher, Altadena, Calif.

Performance data on Soviet detector UZD-9. (S13, ST)

544-S. Methods of Introducing Radioactive Isotopes of Phosphorus Into Metal and Slag. V. N. Shikhov. *Henry Brutcher Translation No.* 3694, 3 p. (From *Zavodskaya Laboratoriya,* v. 21, no. 12, 1955, p. 1482-1483.) Henry Brutcher, Altadena, Calif.

Use of radiophosphorus-32 for study of partition of phosphorus between metal and slag. (S18, B21, Fe)

545-S. Phase Analysis of Titanium Alloys. N. I. Blok, A. I. Glazova and N. F. Lashko. *Henry Brutcher Translation No.* 3781, 7 p. (From *Zavodskaya Laboratoriya,* v. 22, no. 1, 1956, p. 35-38.) Henry Brutcher, Altadena, Calif.

Electrolytic separation of phases using non-aqueous electrolytes. X-ray and differential analysis of the anodic deposits. (S11, M22, Ti)

546-S. Quality Control in a Large Foundry in the Automotive Industry. R. Baggio. *Institute of British Foundrymen,* v. 48, p. 126A-137A; disc., p. 137A-140A.

Optical and dimensional, technological, heat treatment, analytical, X-ray, macro and micrographic, physical and mechanical tests reviewed. (S general, E general)

547-S. Gases in Cast Iron. H. Morrogh. *Institute of British Foundrymen,* v. 48, p. 324A-345A; disc., p. 345A-351A.

Summary of popular views on the influence of gaseous elements. Analysis and sampling of cast iron and pig irons for the estimation of their gaseous elements; analysis of various industrial melts. (S11, CI)

548-S. (German.) **Nondestructive Testing of Aluminum Parts by Means of Fluorescing Penetration.** H. Zbinden. *Aluminium,* v. 32, no. 9, Sept. 1956, p. 566-569.

Detailed description with operating instructions. (S13, Al)

549-S. (German.) **Nondestructive Testing of Materials.** *Energietechnik,* v. 6, no. 8, Aug. 1956, p. 361-367.

Underlying principles and practical applications of various testing methods such as X-radiation, magnetic powder, ultrasonic and radioactive isotope in steam generation equipment. (S13)

550-S. (German.) **Magnetic Methods for Nondestructive Testing of Materials.** E. Hanke. *Feingerätetechnik,* v. 5, no. 8, Aug. 1956, p. 339-344.

Basic processes in magnetic testing are those using magnetic lines of force and inductive processes. Theory and uses. Discussion and use of coercimeters. Use of the inductive method for tests on nonferrous materials. (S13)

551-S. (German.) **Nondestructive Testing of Materials Using the Ultrasonic Echo-Sounding Method.** E. K. Reyer. *Feingerätetechnik,* v. 5, no. 8, Aug. 1956, p. 345-354.

Irradiation techniques, applications, apparatus. (S13)

552-S. (Polish.) **Defect Detection With Ultrasonic Waves.** Tadeusz Frackiewicz. *Wiadomosci Hutnicze,* v. 12, July-Aug. 1956, p. 210-215.

General introduction to history and principles of ultrasonics. Piezoelectric effect in quartz crystals. Apparatus and methods for detecting defects. (S13)

553-S. (Russian.) **Using Radioactive Isotopes to Determine the Coefficient of Transfer of Elements in Welding.** B. I. Bruk. *Svarochnoe Proizvodstvo,* no. 8, Aug. 1956, p. 1-7.

Simple method of determining the portion of the elements in the seam and the slag which came from the base metal, rod and coating. Basis of the method: injecting radioactive isotopes into each of the three sources separately and then measuring the radioactivity of the seam and the slag for each of the three individually. (S19, K1)

554-S. (Spanish.) **Study and Mineralogical Analysis of Lorranine Iron Ores. Their Composition and Concentration Capacity.** Madeleine Deudon. *Instituto del Hierro y del Acero,* v. 9, no. 48, July 1956, p. 815-822.

Improved methods of quantitative and qualitative analysis, applied to some dressed ores, revealed the presence of silicates and carbonates. (S11, B10, Fe)

555-S. How to Get More for Your Metalworking Dollar. VI. Inspection. *Iron Age,* v. 178, Sept. 27, 1956, p. 209-224.

Objectives concerning inspection, quality control, standards, rework and salvage. Organization in relation to master plan, functions, personnel, job description and evaluation, and equipment. (S general, A5)

556-S. Non-Destructive Flaw Detecting. The Use of Supersonics. A. E. Williams. *Iron & Steel,* v. 29, Sept. 1956, p. 439-442.

Ultrasonic method of testing, applications, types of probes and auxiliary equipment. (S13)

557-S. Metal Selector. *Steel,* v. 139, Oct. 1, 1956, 10 p.

Tabulated compositions, properties and uses of leaded steels, spring alloys, copper alloys, cast high alloys, superstrength steels, vacuum-melted metals, high-temperature alloys and high-strength, low alloy steels. (S22)

558-S. (English.) **A Non-Destructive Method for Measuring the Depths of Metallic Surface Layers of Metals.** T. F. Alkér and E. Schalk. *Acta Technica Academiae Scientiarum Hungaricae,* v. 15, no. 1-2, 1956, p. 3-18.

Determines layer-depths on hardened, case-hardened and nitrided

steels produced by heat treatment, electrolytic or other procedures. (S14, J28, ST)

559-S. (English.) **Determination of Oxygen in Steel by the Aluminium Diffusion Method.** C. Georg Carlsson. *Jernkontorets Annaler,* v. 140, no. 8, 1956, p. 551-569.

Alterations in Gotta's aluminum diffusion method made it equivalent or superior to the vacuum-fusion method in all respects except speed and universality. (S11, ST)

560-S. (Czech.) **Nondestructive Testing of Cast Iron Piston Rings.** Vl. Marek. *Strojirenstvi,* v. 6, no. 8, Aug. 1956, p. 532-536.

Testing and sorting is based on the correlation between the magnetic properties of a given material and its microstructure. (S13, S10, CI)

561-S. (French.) **Study of Surface Films by Means of X-Ray Fluorescence.** C. Legrand and J. J. Trillat. *Revue de Métallurgie,* v. 53, no. 8, Aug. 1956, p. 645-648.

Uses characteristic emission rays from a substance submitted to a suitable X-radiation. Intensity of fluorescence varies linearly with thickness for a limited range. (S14)

562-S. (German.) **Experiences With, and Possibilities of, Application of X-Ray Testing Apparatus, Isotopes as Tracers, and Ultrasonic Echo Apparatus in the Steel Foundry.** Hans Zeuner. *Giesserei,* v. 43, no. 18, Aug. 30, 1956, p. 566-571.

X-ray and gamma-ray radiography and ultrasonic tests on steel castings. (S13, CI)

563-S. (Russian.) **A Method of Detecting Deep-Seated Defects in Metals With the Aid of Transverse Ultrasonic Oscillations.** O. O. Kuzmina, N. G. Minaev and A. P. Pshenichnikov. *Zavodskaia Laboratoriia,* v. 22, no. 8, Aug. 1956, p. 943-949.

Description of apparatus and its use on cylindrical objects. Quantitative determination of relations between the various types of defects. Classification of defects located by ultrasonic means in centrifugal steel castings with a wall thickness of 100 mm. and less. (S13, CI, ST)

564-S. (Russian.) **Testing Bearing Balls for Hardness and Flaws by a Bounce Method.** V. K. Grigorovich. *Zavodskaia Laboratoriia,* v. 22, no. 8, Aug. 1956, p. 973-979.

The harder a bearing ball, the higher it will bounce off a hardened steel plate. Height of bounce is less if there are flaws. A mechanism for performing these tests was constructed to be used in place of visual inspection. (S13, Q29, ST)

565-S. Interpreting Service Damage in Rolling-Type Bearings. Robert C. Case. *Bureau of Ships Journal,* v. 5, Oct. 1956, p. 6-12.

Abuse before and during mounting, results of improper mounting, inadequate lubrication, wear from abrasives, corrosion, seizure and smearing, passage of electric current, fatigue. (S21, T7, ST)

566-S. International Standards for Wrought Light Alloys. IV. German Standards. *Light Metals,* v. 19, Sept. 1956, p. 279-280.

Mechanical properties and compositions of German magnesium and wrought aluminum alloys. (To be continued.) (S22, Mg, Al)

567-S. Accounting for Quality. J. M. Goldberg. *Modern Castings,* v. 30, Oct. 1956, p. 58-60.

Demonstrates how statistical quality control was applied in automobile engine foundry. (S12, E general)

568-S. Take Your Pick of Alloys That Can be Cast by PMM Processes. *Precision Metal Molding,* v. 14, Oct. 1956, p. 51-59.

Typical compositions and properties of aluminum, copper, magnesium, lead, tin, zinc, cobalt, iron and nickel base alloys. (S22, E13)

569-S. Gases in Metals. Manley W. Mallett. *Steel,* v. 139, Oct. 8, 1956, p. 94-98.

Metals were analyzed for oxygen, hydrogen and nitrogen by the vacuum-fusion technique. Embrittlement of various metals is caused by gases which are soluble in these metals in minute amounts. Mechanical, magnetic and ultrasonic methods of vibrating molten metal show promise for degassing. (S11, Q23, ST, Al, Zr, Ti)

570-S. (Czech.) **International Standards in Calculation of Welded Joints.** Antonin Hokes. *Zvaranie,* v. 5, no. 7, July 1956, p. 199-206.

Comparison of Czechoslovak welding calculations with international standards. (S22, K1)

571-S. (German.) **Problems of Surface Testing.** Arthur Wiemer and Rudolf Lehmann. *Wissenschaftliche Annalen,* v. 5, no. 8, Aug. 1956, p. 662-686.

Attempt to define criteria and clarify conceptions of surface qualities and their measurement by various methods. Steel, wood and glass were considered. (S15)

572-S. Acceptance Guides for Ultrasonic Inspection of Large Rotor Forgings. A. W. Rankin and C. D. Moriarty. *ASME, Transactions,* v. 78, Oct. 1956, p. 1603-1622.

From the results of trepanning and cutting up a number of forgings, guide lines are established for determining when trepanning should be used for identification of the ultrasonic discontinuities. (S13)

573-S. The Polarographic Determination of Uranium. H. I. Shalgosky. *Analyst,* v. 81, Sept. 1956, p. 512-518.

Sensitivity of the final method is shown and factors that affect sensitivity discussed. Some experimental work is given in detail. (S11, U)

574-S. Pipeline Radiography. Harold Hovland. *British Welding Journal,* v. 3, Sept. 1956, p. 387-391.

Procedures and methods to control weld quality effectively. Qualification tests for radiographers recommended. (S13)

575-S. A Radiochemical Technique for Determining the Specific Surface Area of Aluminium Metal Surfaces. John E. Lewis and Robert C. Plumb. *International Journal of Applied Radiation and Isotopes,* v. 1, nos. 1-2, July 1956, p. 33-45 + 2 plates.

Roughness factor of an aluminum surface is determined by radioactive methods after a phosphoric-chromic acid treatment. (S15, Al)

576-S. Ultrasonic Shear Wave Testing. W. J. McGonnagle. *Metal Progress,* v. 70, Oct. 1956, p. 97-99.

Ultrasonic flaw detection equipment may be used to inspect difficult-to-reach sections by using shear waves rather than the longitudinal waves normally employed. (S13)

577-S. (English.) **Studies on the Determination of Germanium. I. Spectrographic Determination of Germanium in Ores by the Intermittent Arc Method.** Hidehiro Goto and Yu Yokoyama. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 8, no. 3, June 1956, p. 166-172.

Ores were dissolved in nitric acid, germanium was separated by distillation, and, after neutralization, cupric chloride solution was added to the distillate as an internal standard. (S11, Ge)

578-S. (English.) **Influence of Arsenic on the Analysis of Iron and Steel. I. The Determination of Sulphur and Phosphorus in Iron and Steel. II. Determination of Copper and Manganese in Iron and Steel.** Hidehiro Goto and Shiro Watanabe. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 8, no. 3, June 1956, p. 157-165, 223-229.

Method for avoiding the interference of arsenic was established. There was no direct influence of arsenic in the sodium thiosulphate or hydrogen sulphide separation methods. (S11, Cu, Mg, ST, Fe)

579-S. (French.) **Cobalt Analysis Through a High Dispersion Spectrograph in the Visible Field.** Lucien Meunier. Paper from "XXVIII Congreso Internacional de Quimica Industrial". v. I. Saez, p. 595-598.

Description of spectrographic measurement of cobalt impurities such as aluminum, chromium, copper, iron, manganese, lead and zinc. The choice of analytical lines is discussed and the excitation-type spectrum is studied. (S11, Co)

580-S. (German.) **Experience With Spectroscopic Determination of Foreign Elements in Pig Iron.** Carl Frick and Karl Friedrich Lauer. *Archiv für das Eisenhüttenwesen,* v. 27, no. 9, Sept. 1956, p. 557-562.

Equipment used, shape and condition of the specimen, test methods and calibration. (S11, CI)

581-S. (German.) **Defect Detection by the Method of Ultrasonic-Impulse Time.** Erich Martin and Karl Werner. *Archiv für das Eisenhüttenwesen,* v. 27, no. 9, Sept. 1956, p. 579-594.

Investigation on longitudinally expanded specimens of cross and length defects by means of vertical and transverse oscillations. (S13)

582-S. (German.) **Carbon in Nonferrous Metals. V. Carbon in Titanium and Titanium Alloys.** Joseph Fischer and Walter Schmidt. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 9, no. 9, Sept. 1956, p. 434-439.

Potentiometric determination of carbon gives results with an exactness of ± 1.5%. (S11, Ti)

583-S. (Russian.) **A Comparison of the Effectiveness of Various Radioactive Isotopes for Testing the Quality of Welded Joints.** A. S. Fal'kevich and I. E. Neifel'd. *Svarochnoe Proizvodstvo,* no. 9, Sept. 1956, p. 23-24.

Relative advantages and disadvantages of using the soft-radiation iso-

topes, cesium-134, iridium-192, europium-154, and cesium-137, instead of the hard-radiation isotope cobalt-60 for inspection. Recommends the use of cesium-134 and iridium-192, which secure a sensitivity 2 to 3 times higher than cobalt-60. (S13)

584-S. (Spanish.) **X-Rays Are Applied to Welded Joints.** *Fusion de Metales,* v. 18, no. 5, Sept.-Oct. 1956, p. 3-5.

Portable X-ray apparatus for the examination of large welds. (S13)

585-S. (Swedish.) **Testing Materials With Radioactive Isotopes.** J. E. Holmström. *Hitsausteknikka Svetsteknik,* no. 4, July 1956, p. 111-112.

Testing steel and cast iron with gamma-rays emitted by radioactive isotopes such as cobalt-60, cesium-137, iridium-192, and others. Comparison with X-ray technique. Advantages and disadvantages of isotope technique. (S13)

586-S. Magnetic Particle and Penetrant Inspection. R. Bentley. *British Welding Journal,* v. 3, Oct. 1956, p. 494-496.

Method can be used on almost any material, metallic or otherwise, the limitation being that only surface flaws can be detected. Cracks, laps and porosity are clearly shown. (S13)

587-S. A Conductivity Method for the Accurate Determination of Carbon in Low-Carbon Steels. D. F. Dailly and T. A. Elliott. *Chemical Society, Journal,* 1956, Sept. 1956, p. 3398-3404.

Apparatus and procedures. (S11, CN)

588-S. The Aluminum Reduction Method for the Determination of Oxygen in Steel. J. E. Wells. *Iron and Steel Institute, Journal,* v. 184, Oct. 1956, p. 185-187.

A description of the vacuum method adopted. Results are compared with results of the vacuum-fusion method. (S11, ST)

589-S. Efficient Instrumentation for Oil or Gas Fired Heat Treatment Furnaces. L. Walter. *Metal Treatment and Drop Forging,* v. 23, Oct. 1956, p. 420-422.

Various types of furnaces are considered in relation to suitable control instrumentation. Problems of equipment existing and new plants. (S16, J general)

590-S. Spectrochemical Analysis of Titanium and Titanium Alloys by a Porous Cup-Spark Method. M. J. Peterson. *U. S. Bureau of Mines, Report of Investigations* 5256, Sept. 1956, 15 p.

Apparatus, preparation of standards and samples, procedure. (S11, Ti)

591-S. Nondestructive Testing Tips for Non-Ferrous Castings. Rebecca H. Sparling. *Western Metals,* v. 14, Oct. 1956, p. 63, 65, 67-68.

Reasons for defects, radiographic inspection, fluoroscopy and surface penetrant inspection, defects found by these methods. (S13, EG-a)

592-S. Acid Open Hearth Products and Their Specifications. G. R. Fitterer. Paper from "A Study of the Iron and Steel Industry in Latin America". v. II. United Nations, p. 267-276; 289-291.

Specifications for forged and rolled products and for steel castings. The phosphorus and sulphur problem. (S22, D2, ST)

593-S. Standardization in Relation to Control in Steel Production. G. Weston and R. L. Richards. Paper from "A Study of the Iron and Steel Industry in Latin America". v. II. United Nations, p. 400-406; 420-421.

An outline of the principles underlying the control of steel types according to national specifications in highly industrialized countries, with special reference to the factors which operate in Great Britain. (S22, ST)

594-S. The Control of Composition During Steelmaking. G. Weston and G. R. Bolsover. Paper from "A Study of the Iron and Steel Industry in Latin America". v. II, United Nations, p. 406-409.

Control of raw material supplies and of composition in the melting unit; control after leaving the furnace. (S18, D general, ST)

595-S. (French.) **Nitrogen Analysis in Steels by the Wet Process.** J. Calmettes and J. Drain. *Revue de Métallurgie,* v. 53, no. 9, Sept. 1956, p. 682-688.

Uses the absorptiometric analysis of ammonia distilled from etching solutions. (S11, ST)

596-S. (French.) **Contribution to the Study of the Determination of Nitrogen in Cast Iron.** J. Marot. *Revue de Métallurgie,* v. 53, no. 9, Sept. 1956, p. 689-700.

Analysis for nitrogen entailed perfecting an apparatus for vacuum smelting in the presence of sodium peroxide, because the Kjeldahl process allowed the gaseous nitrogen to escape. (S11, CI)

597-S. (German.) **Contactless Thickness Measurement of Nonferromag-**

netic Metals. F. Benz. *VDI Zeitschrift,* v. 98, no. 29, Oct. 1956, p. 1680.

Application of a varying magnetic field for inductive measurement of thickness. The current displacement effect produces a shielding which depends on the thickness of the metal being measured. (S14)

598-S. (Russian). **Ultrasonic Detection of Laminations in Sheet Metal.** P. P. Khramov and G. V. Prorokov. *Zavodskaia Laboratoriia,* v. 22, no. 9, Sept. 1956, p. 1065-1068.

An experimental electronic device for inspection of sheet metals. (S13)

599-S. (Russian.) **Ultrasonic Signal Reflection Method of Testing Turbine Disks.** B. Ia. Litvinenko. *Zavodskaia Laboratoriia,* v. 22, no. 9, Sept. 1956, p. 1068-1070.

Experimental data on the use of the ultrasonic reflection method for detecting defects. (S13)

600-S. (Russian.) **Radioactive Tracer Method of Determining Processing Time of Materials in the Sponge Iron Kiln.** V. F. Kniazev and O. V. Travin. *Zavodskaia Laboratoriia,* v. 22, no. 9, Sept. 1956, p. 1071-1072.

Data on the use of radio calcium-45 for determining processing time in the rotary kiln sponge iron process. (S19, D8, Fe)

601-S. Etch Penetrant Pinpoints Casting Surface Defects. G. Tyler. *Iron Age,* v. 178, Nov. 1, 1956, p. 96-97.

New technique developed for inspection on critical aircraft castings; 10-min. test is applied at foundry level. (S13, Mg)

SECTION T

APPLICATIONS of METALS in EQUIPMENT and INDUSTRY

1-T. Nimonic Alloys and Other Heat-Resistant Materials in Sheet Form. H. E. Lardge. *Metal Treatment and Drop Forging,* v. 22, Oct. 1955, p. 445-448.

Reviews position and details of some nickel-base alloys and stainless steels used in modern aircraft. Photographs, table. (T24, SS, Ni-g)

2-T. Problems in Materials for Nuclear Power. John P. Howe. Paper from "Nuclear Metallurgy" IMD Special Report Series No. 1. American Institute of Mining and Metallurgical Engineers, p. 9-28.

Considers environmental requirements, design and development of components and processes, and their interaction in the reactor. Eight reactor schemes studied. Graphs, diagrams, tables, photographs. 24 ref. (T25)

3-T. (Japanese) **Anti-Corrosive Copper Alloys for Boiler Parts of Steam Locomotives.** Toshio Saito, Kazuo Ohyama and Yorihisa Yoshinari. *Journal of Railway Engineering Research (Japan),* v. 12, no. 15, Aug. 10, 1955, p. 371-387.

New machining method will permit use of naval brass which exhibits absence of crystallization compound of base metal other than copper and great hardness. Micrographs, photographs, graphs, diagrams, tables. (T25, R4, G17, Cu)

4-T. Selection, Care, and Installation of Anti-Friction Bearings. E. P. Stahl. *Machinery,* v. 62, Nov. 1955, p. 166-175.

Explains classification and discusses miniature ball, roller and other types. Diagrams. (T7, SG-c)

5-T. Spheroidal-Graphite Cast Iron Dies and Tools for the Sheet-Metal Industries. A. B. Everest. *Sheet Metal Industries,* v. 32, no. 343, Nov. 1955, p. 805-812.

Review of spheroidal-graphite cast iron as used in tools. Photographs, table. (T5, CI)

6-T. The Use of Tungsten Carbide in the Sheet-Metal Industry. B. Elliott and J. Evans. *Sheet Metal Industries,* v. 32, no. 343, Nov. 1955, p. 813-821.

Discusses higher production runs achieved where components are produced with the use of tungsten carbide dies and die inserts. Diagrams, photographs. (T5, W)

7-T. The Use of Hard Aluminium Bronze as a Material for Press Tools. S. C. Jones. *Sheet Metal Industries,* v. 32, no. 343, Nov. 1955, p. 822-825; disc., p. 825-828, 830.

Discusses Narite dies for use in pressing and drawing. Photographs. (T5, T6, G1, G4, Cu)

8-T. (Hungarian.) **Economic Design of a Transformer With Aluminium Windings.** Kalman Saringer. *Elektrotechnika,* v. 48, no. 10, Oct. 1955, p. 306-309.

All characteristics of a transformer are determined in relation to a circle drawn around the iron core; approximates the ratio between the flux and the number of turns. Diagram, graphs, tables. (T1, Al, Cu)

9-T. Low Voltage Nickel-Chromium Elements for Heat Treatment. *Canadian Metals,* v. 18, Nov. 1955, p. 22-23.

Corrtherm elements have a tightly adhesive oxide coating and high-temperature enamel which enable a furnace to be operated at high temperature and low voltage. Photographs. (T5, J general, Ni, Cr)

10-T. The Development of an Electrode for Metal Arc Welding of Wrought 35 Ni-15 Cr-1¼ Si Alloy.

Paul Goetcheus and Rollo Boring. *Industrial Heating,* v. 22, Nov. 1955, p. 2282 + 10 pages.

A rod known as RA-330-80 was found best for use in welding the alloy. Photographs, diagram, table. 7 ref. (T5, K1)

11-T. Research—As Applied to Some Metallic Materials for the Petroleum Industry. B. B. Morton. *Mines Magazine,* v. 45, Oct. 1955, p. 115-118, 128.

An outline of research carried on by the International Nickel Co., Inc. Photographs, table, graphs. (T28, AY, Ni, Cu)

12-T. Noral Snaprib Roofing Sheet. *Modern Metals,* v. 11, Nov. 1955, p. 58.

Installed with continuous snap-joint and concealed clips, new material provides leak-proof cladding without holes or exposed fasteners; sold in 20-ft. lengths and three finishes. Photograph. (T26, Al)

13-T. Coming Up: The Big Applications of Aluminum in Automobiles. Leo Swoboda. *Modern Metals,* v. 11, Nov. 1955, p. 62, 64, 66.

Present and future uses of aluminum for anodized colored trim parts, radiators, engines, structural elements. Table, photographs, diagram. (T21, Al)

14-T. Glass-Aluminum Towers. *Modern Metals,* v. 11, Nov. 1955, p. 72, 74, 76.

New apartment projects on Chicago's lakefront to employ unique curtain wall grids made of anodized aluminum extrusions and tinted glass. Design factors and installation procedures. Photograph, diagrams. (T26, Al)

15-T. Ferrous Materials in Marine Engineering. S. F. Dorey. *North East Coast Institution of Engineers & Shipbuilders, Transactions,* v. 72, Nov. 1955, p. 27-56.

New fabrication and treatment processes reviewed. Tables. 21 ref. (T22, Fe)

16-T. Ductile Iron—A New Material for Petroleum Pipe. Maurice Grandpierre and C. C. Reynolds. *Oil and Gas Journal,* v. 54, Nov. 21, 1955, p. 192-194, 197.

Mechanical and physical properties of ductile iron that would be advantageous in petroleum pipe. Graph, micrographs, photographs, tables. 6 ref. (T28, Q general, CI)

17-T. Hydramatic Shifts Gears. Floyd G. Lawrence. *Steel,* v. 137, Nov. 28, 1955, .p 79-80.

Advantages, fabrication and aluminum applications in hydraulic transmission. Photograph. (T21, G17, ST, Al)

18-T. A Missing Link for Chain. H. F. Reid, Jr. *Steel,* v. 137, Dec. 12, 1955, p. 100-101.

Uses, advantages, description, specifications for welded aluminum chain. Photographs, tables. (T7, Al)

19-T. Zirconium and Its Application to Nuclear Reactors. H. Etherington, R. C. Dalzell and D. W. Lillie. Paper from "The Metallurgy of Zirconium". National Nuclear Energy Series, Division VII—v. IV. McGraw-Hill Book Co., p. 1-18.

Nuclear properties, advantages, uses of zirconium alloys in reactors. Graphs, table. 11 ref. (T25, Zr)

20-T. Application of Zirconium for Other Uses. R. I. Jaffee. Paper from "The Metallurgy of Zirconium". National Nuclear Energy Series, Division VII—v. IV. McGraw-Hill Book Co., p. 19-49.

Advantages and uses of zirconium alloys and compounds in chemical and electrical equipment, as an alloying addition, and in miscellaneous applications. Photographs, tables, graphs, diagram. 66 ref. (T29, T1, Zr)

21-T. (French.) High-Strength Cast Irons for Diesel Engines. C. R. Van Der Ben. *Fonderie,* 1955, no. 116, Sept., p. 4671-4679; disc., p. 4680.

Survey of physical characteristics, production processes, quality, production costs as factors in selection. Tables, micrographs, photographs. (T25, CI)

22-T. (French.) Economic Advantages of Aluminum Conductors in Rural Electrification Lines. A. Dalmasso. *Revue de l'aluminium,* v. 32, no. 224, Sept. 1955, p. 831-838.

Cost comparison between aluminum and copper shows estimated 20% savings. Emphasizes durability and lack of technical problems. Tables, graphs. (T1, Al, Cu)

23-T. (Hungarian.) The Manufacture of Carbide Drill Bits in Hungary. Development of a New Branch of Industry. György Adorjan. *Banyaszati lapok,* v. 10, no. 10, Oct. 1955, p. 545-548.

Investigates material and production methods, pilot-plant production, experiences of large-scale manufacture. Diagram, table, graph, photographs. (T6, C-n)

24-T. (Russian.) Low-Alloy Steel 18DGS-L for Detailed Casting of Components in Hydraulic Installations. I.

R. Krianin and G. I. Babushkina. *Metallovedenie i obrabotka metallov,* 1955, no. 2, Aug., p. 28-32.

Relation of crystal lattice parameter of quenched copper-manganese-silicon steel to copper content; relation between cavitation resistance and carbon content. Tests of other properties, including strength, plasticity and resistance to corrosion show this group of steels may substitute for certain cast high-chromium steels in turbine parts. Graphs, table, photographs. (T4, M26, Q general, R general, CI)

25-T. (Book.) **Constructional Steelwork.** Oscar Faber. 368 p. 1955. Philosophical Library, 15 East 40th St., New York 16, N. Y. $12.00.

Based on latest British regulations for use of structural steel in building. Consideration is given to the elementary principles of design, materials, properties, specifications, working stresses, connections, and welding. (T26, ST)

26-T. (Book.) **Curtain Walls of Stainless Steel.** 188 p. 1955. School of Architecture, Princeton University, Princeton, N. J.

Examples of stainless steel usage in buildings; design factors; structural properties. (T26, Q23, SS)

27-T. (Book.) **Nuclear Metallurgy.** IMD Special Report Series No. 1. 126 p. 1955. American Institute of Mining and Metallurgical Engineers, 29 West 39th St., New York 18, N. Y. $3.75.

Papers presented at a recent symposium covering power reactors; problems in materials for nuclear power; plutonium metal; physical metallurgy of thorium and uranium. (T25, P general, Th, Pu, U)

28-T. Fiber-Metallurgy—Its Use for Slip Ring Brushes. H. B. Nudelman, A. G. Metcalfe, and C. H. Sump. *Aeronautical Engineering Review,* v. 14, Dec. 1955, p. 31-32, 44.

Development of a molybdenum brush that helps solve the problem of brush bounce and thus reduces electrical noise in high-altitude flight. Micrograph, photograph. (T1, Mo)

29-T. American Experience With Magnesium Alloys. H. Wilkin Perry. *Aircraft Engineering,* v. 27, Dec. 1955, p. 417-417.

Recent work on aircraft primary structures in magnesium. Photographs, tables. (T24, Mg)

30-T. Miniature Metallized Lacquer-Film Capacitors. H. G. Wehe. *Bell Laboratories Record,* v. 33, Dec. 1955, p. 441-444.

Bulky pre-World War II capacitors were miniaturized first by depositing metal on thin strips of lacquered paper. Now, by a process invented at Bell Telephone Laboratories, the paper can be removed to leave only a thin film of metallized lacquer. These capacitors are particularly applicable to low-voltage circuits using transistors, and greatly conserve space. Photographs, diagrams, graph. (T1, L25)

31-T. Magnesium in the Volkswagen. L. C. Boehner. *Metal Industry,* v. 87, Dec. 2, 1955, p. 469-470.

Methods used in production of transmissions, engines and axles; advantages derived from use of magnesium in these parts. Table. (T21, Mg)

32-T. Aluminum Alloys Move Into Structural Markets. J. M. Pickett. *Civil Engineering,* v. 25, Dec. 1955, p. 44-47.

Increasing tensile strength of aluminum, by perfecting its alloys, increases its structural applications. Photographs. (T26, Q23, Al)

33-T. Developments in Collapsible Metal Tube Packaging. Lester B. Platt. *Drug and Cosmetic Industry,* v. 77, Dec. 1955, p. 779 + 5 pages.

Methods of solving special problems of liners caused by the unusual chemical composition of the new "wonder" drugs. Photographs. (T10, Al)

34-T. Metallurgy of Nuclear Power Production. A. B. McIntosh. *Engineer,* v. 200, Nov. 25, 1955, p. 759-763.

Metallurgical problems introduced in the preparation and irradiation of uranium or plutonium fuels; principles of protection of the fuel in fuel elements and limitations imposed by interaction of fuel, container and coolant. Graphs, tables, diagrams. (T25, U, Th)

35-T. Gettering of Gas by Titanium. Virgil L. Stout and Martin D. Gibbons. *Journal of Applied Physics,* v. 26, Dec. 1955, p. 1488-1492.

Methods used in gas sorption studies; specific gases and their reaction with titanium. Diagrams, graphs, table. 11 ref. (T1, N15, Ti)

36-T. Structural Materials for Heat Transfer in Nuclear Reactors. I. Selecting Materials for Liquid Sodium Systems. II. Zirconium Alloy for Water Systems. R. F. Koenig, E. G. Brush, D. E. Thomas and F. Forscher. *Materials & Methods,* v. 42, Dec. 1955, p. 110-117.

Problems considered are corrosion resistance, mass transfer, mechan-

ical effects and transfer of radioactivity, if sodium is used as a heat transfer agent. Summarizes information available on the physical and mechanical properties and corrosion properties of Zircaloy-2, and its use in nuclear reactors. Micrographs, graphs, tables, photograph. 5 ref. (T25, R6, Zr)

37-T. Expanded Aluminum. *Modern Metals,* v. 11, Dec. 1955, p. 40, 42.

Advantages of this form over solid sheets, methods for producing both standard and flattened types, fabrication methods, and applications. Photographs. (T26, Al)

38-T. Target: Tops in Containers. E. A. Ferrell. *Modern Metals,* v. 11, Dec. 1955, p. 79-80, 82.

Rapid increase in the number of uses for aluminum foil has resulted in Alcoa and Ekco to pool their know-how and resources and bid for foil's biggest market. Photographs. (T10, Al)

39-T. Long Life Components in High Speed Equipment. Carl Siebke. *Precision Metal Molding,* v. 13, Dec. 1955, p. 47-48, 80.

Both investment and die castings are used to give the best functioning parts for high-speed presses. Photographs. (T5, E13, E15, Zn, Al)

40-T. Gas Turbines: Where Investment Castings Fit In. *Precision Metal Molding,* v. 13, Dec. 1955, p. 54-55, 64-65.

Current and future applications of investment castings. Diagram, photographs. (T25, E15)

41-T. (French.) Punching and Stamping Tools Made of Zinc Alloy. Robert H. Lebre. *Métaux corrosion industries,* v. 30, no. 361, Sept. 1955, p. 357-362.

Characteristics of alloys Kayem-1 and Kayem-2; method for tool production; field of application of tools. Tables. (T6, Zn)

42-T. (German.) Light-Metal Nails. E. Nachtigall and H. Landerl. *Aluminium Ranshofen, Mitteilungen,* v. 3, no. 2, Oct. 1955, p. 36-40.

Calculation of bending stress, relation between material characteristics and diameter, comparison with commercial steel nails, suggestion for suitable nail shape, application of aluminum materials. Tables, graphs, photographs. (T7, EG-a)

43-T. Calibrated Tension-Bolt. *Aircraft Production,* v. 17, Dec. 1955, p. 492-493.

Techniques of assessing load in bolts. Specially designed bolt that can be pretensioned to a specified load overcomes some of the limitations of these systems. Graphs, diagrams. (T7, Q27)

44-T. Bolting Materials for High-Temperature Steam-Plant Service. M. G. Gemmill and J. D. Murray. *Engineering,* v. 180, Dec. 16, 1955, p. 824-827.

Outline of developments in meeting increasingly severe requirements for ferritic bolt steels. Graphs, tables. 3 ref. (T7, SS)

45-T. Millions of Balls—Millionth Tolerances. Edwin H. Goodridge, Jr. *Machinery,* v. 62, Dec. 1955, p. 143-151.

Manufacturing process for balls for use in bearings and various other applications. Diagrams, photographs. (T7, G general, ST)

46-T. Selection, Care, and Installation of Anti-Friction Bearings. E. P. Stahl. *Machinery,* v. 62, Dec. 1955, p. 174-182.

Sealing, care and installation of ball and rolling bearings. Diagrams, table. (T7, SG-c)

47-T. Carbon Steel Promises Cheaper Reactor Systems. R. U. Blaser and J. J. Owens. *Nucleonics,* v. 14, Jan. 1956, p. 68-71.

Use of carbon steel in reactor systems; effect of temperatures and velocity on rate of corrosion. (T25, R4, ST)

48-T. Aluminum in Heavy Current Conductors. William Deans. *Power Apparatus and Systems,* no. 21, Dec. 1955, p. 1192-1198; disc., p. 1198-1200.

Properties of both copper and aluminum bus conductors, design requirements for conductors and joints to obtain satisfactory performance. Tables. (T1, Cu, Al)

49-T. Experiences With the Use of Aluminum in Windings for Dry-Type Power Transformers. E. W. Tipton. *Power Apparatus and Systems,* no. 21, Dec. 1955, p. 1201-1204.

Reasons for application of aluminum to this type of transformer; basis of design; electrical, mechanical, and thermal properties and their effect on design; comparison of aluminum and copper-wound transformers; various types of joints; cost data. Photograph, tables, graphs, diagrams. (T1, Al)

50-T. Rings Truer With Quench Press. Arthur G. Portz. *Steel,* v. 137, Dec. 26, 1955, p. 66-67.

Materials used, heat treatment and rigid specifications involved in production of compressor blade retainer rings for jet engines. Diagram, micrographs, photographs. (T7, AY)

51-T. Autos Go Heavy on Light Metals. M. F. Garwood and F. H. Mason. *Steel,* v. 138, Jan. 16, 1956, p. 82-83, 85.

Importance of light metals in the automobile industry today, especially aluminum and magnesium. Subjects emphasized include economy, methods, designing, materials, wear, corrosion. Graph, photographs, table. (T21, Al, Mg)

52-T. Engineering Aspects of Liquid Metals for Heat Transfer. Thomas Trocki. Paper from "Handbook of New Nuclear Techniques". Nucleonics, p. 5-9.

Promise as reactor coolants and heat-transfer fluids for systems operating above 600° F. Tables. 2 ref. (T25, K, Na, Pb, Bi, Hg, Li)

53-T. (English.) Banding Hollow Bodies in High-Tensile Steel Wire. *Aciers fins & spéciaux francais,* no. 21, Nov. 1955, p. 51-54.

Steel wire banding and coiling lessens weight of pressure vessels giving a product with greater safety. Photographs. (T29, ST)

54-T. (English.) Utilization of Steel in the Construction of Multi-Level Car Parks. J. J. Thiry. *Acier, Stahl, Steel,* v. 20, no. 11, Nov. 1955, p. 435-440.

Design of some German and American car parks and advantages of steel in their construction. Photographs, diagrams. (T26, ST)

55-T. (Czech.) Manufacture of Locomotive Boilers. M. Jaros. *Strojirenska vyroba,* v. 3, no. 10, Oct. 1955, p. 421-430.

Sequence of technological processes includes patterns for stamping forms, drilling of holes, welding, other operations. Tables, diagrams, photographs. 4 ref.
(T23, G3, G17, K general)

56-T. (Czech.) Liquid Metals—Heat-Exchange Media. V. Krizek. *Strojirenstvi,* v. 5, no. 9, Sept. 1955, p. 664-670.

Media with high coefficients of heat transfer. Possibilities of using these metals in making heat exchangers and steam generators, applications in atomic electric-power stations. Graphs, tables, photographs, diagrams. 15 ref. (T25)

57-T. (Czech.) Use of Sodium in Heat-Exchangers. F. Dubsek. *Strojirenstvi,* v. 5, no. 11, Nov. 1955, p. 819-824.

Basic physical properties of sodium as a heat-exchange medium. Use of sodium in nuclear reactors and its advantages over other coolants. Design of sodium heat-exchangers. Graph, tables, diagrams, photographs. 10 ref. (T25, Na)

58-T. Still More Aluminum Used in Cars for 1956. R. E. Conlee. *Automotive Industries,* v. 114, Jan. 15, 1956, p. 48 + 4 pages.

Automotive industry is finding many uses for aluminum, owing to its corrosion resistance and reasonable cost. Tables, diagram.
(T21, Al)

59-T. Aluminum Pipe Coupler for Line Pipe Forms Joint Easily. J. E. Zachary. *Drilling,* v. 17, Jan. 1956, p. 118.

One-piece slip-lock coupler for use in petroleum industry. To form a union, it is necessary only to insert plain end of pipe into couple and release spring lock tilting ring. Diagrams. (T28, Al)

60-T. Fabricating Copper-Lined Water Heater Tanks. *Finish,* v. 13, Jan. 1956, p. 23R-25R.

Fabrication problems for an air-tight and leak-proof "tank within a tank" assembly. Photographs.
(T26, F general, G general, Cu, ST)

61-T. The Automotive Gas Turbine—A Challenge to Foundries. Robert H. Herrmann. *Foundry,* v. 84, Jan. 1956, p. 76-83.

Principles and operation of gas turbine engines, problems of foundries to supply quality castings needed for engine requirements. Diagram, photographs.
(T21, E general)

62-T. An Aluminium River Tanker Design. E. C. B. Corlett and K. J. Fryer. *Institution of Engineers & Shipbuilders in Scotland, Transactions,* v. 99, pt. 2, 1955-1956, p. 71-94; disc., p. 94-104.

Design study of a small tanker designed to accommodate a greater dead weight on limiting dimensions sometimes met within this class of vessel. Final result in aluminum permits a useful increase in deadweight carrying capacity. Diagrams, tables. (T22, Al)

63-T. Atoms for Peace. Metallurgical Topics Discussed at Geneva. John P. Howe. *Metal Progress,* v. 69, Jan. 1956, p. 79 + 10 pages.

Major problems relating to metallic materials of construction for various power reactors now under construction or design. Photographs. (T25)

64-T. Prehardened Mold Steels for the Plastics Industry. Birger L. Johnson. *SPE Journal,* v. 12, Jan. 1956, p. 37 + 4 pages.

Properties of Cascade steel, a precipitation hardening steel containing 4% nickel, 1% aluminum, and 0.2% carbon. Graphs.
(T29, ST)

65-T. Detroit Edison Survey. John O. Blair. Paper from "Metal Curtain

Walls". Building Research Institute, Division of Engineering and Industrial Research, National Academy of Sciences—National Research Council, p. 39-42.

Use of 3S Alclad metal curtain walls in the River Rouge power plant project. Photograph. (T26, Al)

66-T. The Design of Metal Curtain Walls. John Hancock. Paper from "Metal Curtain Walls". Building Research Institute, Division of Engineering and Industrial Research, National Academy of Sciences—National Research Council, p. 79-98; disc., p. 117-120.

Properties and characteristics of stainless steel, application of the properties in panel design. Graphs, diagrams, photographs. (T26, SS)

67-T. (Japanese.) **Studies on the Rock Drilling Tools. The Metallurgical and Rock Drilling Test of the Krupp Widia Rock Bits.** Saburo Takaoka and Shigeru Fujii. *Resources Research Institute, Report (Japan),* no. 29, Nov. 1955, 35 p.

Tungsten carbide tip of the bit has a high resistance to wear. Bits are classified according to the material of the bit body, heat treatment, and brazing method. Graphs, micrographs, tables, photographs. (T28, Q9)

68-T. Castings in Airframe Design. G. W. Papen. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 425-432; disc., p. 433.

Means for expanding use of castings in aircraft. Photographs, diagrams, tables, graph. (T24)

69-T. Use of Steel Castings by Southern Pacific. B. F. Kline. *American Foundrymen's Society, Transactions,* v. 63, 1955, p. 650-656.

General report on steel used, with comparative figures on the use of castings in freight car building and maintenance. Reference to AAR specifications for material and design of steel castings used on the railroads. Tables, diagrams, photographs. (T23, CI)

70-T. Beryllium Copper Pays Its Fare. *Steel,* v. 138, Jan. 23, 1956, p. 81-82.

Beryllium-copper castings are proved superior for use in taximeters. Photographs. (T8, Be, Cu)

71-T. Titanium Takes Away the Heat. *Steel,* v. 138, Jan. 30, 1956, p. 106.

Use of titanium in helicopter exhaust system brings up to 50% savings in weight. Photographs. (T24, Ti)

72-T. Design, Fabrication and Feasibility Studies of Four Reactor Pressure Vessels for United States Atomic Energy Commission. Paper from "Feasibility Study of Pressure Vessels for Nuclear Power Generating Reactors." AECU-3062. U. S. Atomic Energy Commission, p. 1-109.

Description of each vessel, material selection, welding techniques and heat treatment procedures, estimated cost of each unit, shipping and handling details, special problems. Diagrams, graphs. 6 ref. (T26)

73-T. Report on Feasibility Study of Pressure Vessels. Paper from "Feasibility Study of Pressure Vessels For Nuclear Power Generating Reactors". AECU-3062, U. S. Atomic Energy Commission, p. 111-120.

Design and fabrication feasibility studies of four pressurized water reactor shells. Diagrams. (T26)

74-T. Final Report on Reactor Vessel Study. L. G. Pfeiffer. Paper from "Feasibility Study of Pressure Vessels for Nuclear Power Generating Reactors". AECU-3062. U. S. Atomic Energy Commission, p. 225-354.

Study covering the mechanical design, manufacturing procedures and cost estimates, based on specified diameters, lengths and number and size of openings. Diagrams, graphs, photographs. (T26)

75-T. (German.) **Material Problems in Construction of Nuclear Reactors.** W. Siegfried. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 21, no. 12, Dec. 1955, p. 377-391.

For selection of materials for nuclear reactors, their neutron absorption and artificial radioactivities are of chief concern. Before unknown purity levels of all materials have been required. Corrosion problems. Tables, graphs, diagrams, photographs. 11 ref. (T25, R general)

76-T. (Book.) **Chemical Engineering Materials.** Frank Rumford. 382 p. 1955. Chemical Publishing Co., Inc., 212 Fifth Avenue, New York 12, N. Y.

Corrosion mechanisms; tests, properties, and applications of corrosion resisting metals and nonmetals. (T29, R general, SS, SG-g)

77-T. (Book.) **Feasibility Study of Pressure Vessels for Nuclear Power Generating Reactors.** Frank W. Davis, compiler. AECU-3062. 366 p. 1955. U. S. Atomic Energy Commission. Available from the Office of Technical Services, Department of Commerce, Washington 25, D. C. $1.75.

Compilation of four reports covering material selection; fabrication techniques, cost data, and special problems involved. Individual

papers abstracted separately. (T26)

78-T. (Book.) **Knife-Edge Bearings.** P. J. Geary. B.S.I.R.A. Bibliographical Survey of Instrument Parts No. 2. 61 p. 1955. British Scientific Instrument Research Association, 'Sira', South Hill, Chislehurst, Kent, England.

Emphasizes design and properties of bearings to indicate areas where more fundamental research might be undertaken. A comprehensive bibliography covers the period from about 1900 to date. (T8)

79-T. (Book.) **Metal Curtain Walls.** Charles R. Koehler, Ed. 190 p. 1955. Building Research Institute, Division of Engineering and Industrial Research, National Academy of Sciences —National Research Council, Washington, D. C. $4.00.

Progress made and the potentials and limitations in the development of metal wall construction; architectural and structural design techniques, and performance requirements in panel design. (T26)

80-T. Ferrous Materials in Marine Engineering. S. F. Dorey. *Alloy Metals Review,* v. 8, Dec. 1955, p. 2-7.

Alloy steels and cast irons as applied to shafting, reduction gearing, turbines, steam plant and propellers. Tables. (T22, CI, ST)

81-T. Use of Sodium and of Sodium-Potassium Alloy as a Heat-Transfer Medium. II. W. B. Hall and T. I. M. Crofts. *Engineer,* v. 201, Jan. 27, 1956, p. 128-130.

Design of various parts of liquid metal circulating systems. Apparatus for heat-transfer measurement and for cavitation study. Diagrams, graphs. 12 ref.
(T25, EG-e)

82-T. The Future Use Pattern for Titanium. B. S. Mesick. *Journal of Metals,* v. 8, Jan. 1956, p. 42-46; disc. 46-48.

Factors which will influence future of titanium industry, possible applications in addition to aircraft parts, economic factors, properties. Tables, graphs, photograph. 7 ref. (T general, Ti)

83-T. Jet and Rocket Applications of the New Metals. II. G. D. Johnson. *Journal of Space Flight,* v. 8, Jan. 1956, p.1-6.

Properties, advantages and disadvantages of molybdenum and its alloys, behavior and applications of various refractory oxides and cermets, properties and possible applications of the reactor metals, zirconium, vanadium, hafnium and gadolinium.
(T24, T25, Mo, Zr, V, Hf, Gd)

84-T. The Manufacture of Watch Springs. *Machinery (London),* v. 87, Dec. 30, 1955, p. 1508-1517.

Machinery, materials and methods for production and testing of watch springs and catch pieces for the springs. Photographs.
(T9, CN-s)

85-T. How Chrysler Uses Light Metals. M. F. Garwood and F. H. Mason. *Modern Metals,* v. 11, Jan. 1956, p. 33 + 4 pages.

Advantages of aluminum and magnesium, such as availability, savings due to elimination of many machining operations and higher machining rate; decorative applications and design problems. Photographs, graph. (T21, Al, Mg)

86-T. Magnesium Alloys in the German Volkswagen. Ludwig C. Boehner. Paper from "The User Speaks About Magnesium". Magnesium Association, 6 p. + 3 plates.

Advantages of using magnesium castings in engine, rear axle and transmission assembly; details of design and production of these castings. Tables, photographs.
(T21, E general, Mg)

87-T. Magnesium Design Promotes Radar Portability. Paul W. Peay. Paper from "The User Speaks About Magnesium". Magnesium Association, 6 p. + 2 plates.

Recommendations regarding the manufacture of portable radar from magnesium. Specifications relative to deflection, rigidity, strength, galvanic corrosion, sharp corners, notch effects and stress concentrations due to changes in section, and drilled holes. Tables, photographs.
(T1, Mg)

88-T. Magnesium Sets New Travel Style. Louis R. Degen. Paper from "The User Speaks About Magnesium". Magnesium Association, 6 p. + 2 plates.

Reviews development and use of magnesium and plastic to manufacture luggage, with some details relative to the process used. Photographs. (T10, Mg)

89-T. Magnesium Tooling—Aid to Production. Thor H. Bahrman. Paper from "The User Speaks About Magnesium". Magnesium Association, 6 p. + 4 plates.

Primary considerations that led to the selection of magnesium for tooling were weight, machinability, weldability, high coefficient of expansion and cost. Photographs.
(T5, G1, Mg)

90-T. Use of HK31 Magnesium-Thorium Alloy for Ramjet Engine Construction. Alan V. Levy. Paper

from "The User Speaks About Magnesium". Magnesium Association, 15 pages + 8 pages.

For the ever-increasing speed demands placed on piloted and pilotless aircraft, a magnesium-base alloy has been developed which has attractive properties to the designer concerned with 500-700° F. operation at speeds in excess of Mo = 2·5. It is light, retains high strength and elastic modulus to 600° F. and above, has good creep resistance, and can be heat treated and welded. Tables, graphs, photographs. 5 ref. (T25, Th, Zr, Mg)

91-T. (French.) Sealed Bags for Packing Made of Aluminum Complexes. Pierre Prévot. *Revue de l'aluminium,* v. 32, no. 226, Nov. 1955, p. 1025-1031.

Properties and applications of aluminum laminated plastic films as packaging materials. Photographs, tables, diagrams. (T10, L26, Al)

92-T. (Italian.) Development of Titanium and Applications in Aeronautics. Riccardo Masaniello Corelli. *Aerotecnica,* v. 35, no. 5, Oct. 1955, p. 235-248.

Recent developments in titanium metallurgy, present and potential uses in structures of airplanes, missiles and aircraft engines. Diagrams, tables, micrographs, photographs. 29 ref. (T24, Ti)

93-T. Selecting Constructional Steels for Aircraft Design. C. L. Hibert. *Aero Digest,* v. 72, Feb. 1956, p. 24-33.

Examination of alloy steels in terms of toughness. Covers plastic deformation, tempering, fatigue limit, heat treatment, carbon effects, design notes. Graphs, tables. (T24, Q general, J general, AY)

94-T. New Carburizing Steels for Critical Gearing. I. R. S. Archer, V. A. Crosby and G. A. Timmons. *Iron Age,* v. 177, Feb. 9, 1956, p. 92-95.

Steels containing molybdenum as principal alloying agent offer top carburizing quality with greater economy and are easy to machine. They can be quenched directly from carburizing temperatures without excessive retained austenite. Diagram, graph, photograph. 3 ref. (T7, J28, TS)

95-T. Magnesium Air Frame. Thomas A. Dickinson. *Light Metals,* v. 19, Jan. 1956, p. 15-17.

Characteristics of first all-magnesium airframe to be given flight tests. Photograph, graphs, diagram, table. (T24, Mg)

96-T. Many Applications for B & P Magnesium Printing Plates in Graphic Arts Field. *Magnesium,* February 1956, p. 6-7.

Hard surface, low cost and weight, and precision manufacturing make magnesium plates desirable for many applications. Photographs. (T9, Mg)

97-T. Present and Future Uses of Scarce Metals. Chester T. Sims. *Materials & Methods,* v. 43, Jan. 1956, p. 80-84.

Physical properties, applications, sources, supply and costs of the transition and precious metals, and semiconductors. Photographs, tables. (T general, EG-c)

98-T. Aluminium Cable Installation. Use of Light Metal for Sheath and Core. *Metallurgia,* v. 53, no. 315, Jan. 1956, p. 18-20.

Details on cables in British extrusion plant include quality and types, economic considerations, distribution layout, installation, joints and terminations, lighting installation. Photographs, table. (T1, Al)

99-T. Forgings for the Motor Industry. A. J. Wyatt. *Metal Treatment and Drop Forging,* v. 23, Jan. 1956, p. 29-36; disc. 36-38.

The quality of drop forgings for the motor industry and the means by which metal economy might be improved from the customers' point of view. Tables, photographs, diagrams. (T21, F22, ST)

100-T. Zinc Die Castings for Marine Hardware. Marvin Perkins. *Precision Metal Molding,* v. 14, Feb. 1956, p. 59.

Chromium plated zinc die castings are adapted to marine applications at lower cost than brass or bronze units. Photographs. (T22, E15, Zn, Cr)

101-T. Fabrication in Electrical Plant Manufacture. R. M. Watts. *Welding and Metal Fabrication,* v. 24, Jan. 1956, p. 2-10.

Growth, steel stockyards, preparation of material for fabrication, storage and handling of prepared parts, assembly and welding, finishing processes, supervision, production, technical control of an English electrical company. Diagrams, table, photographs. (To be continued.) (T1, ST)

102-T. Plastic-Clad Aluminum Makes Lightweight Aircraft Parts. *Western Machinery and Steel World,* v. 47, Feb. 1956, p. 88-89.

Plastic-clad 24S-T4 aluminum is used for hydraulic pistons of shock-absorbing landing gear struts providing a high strength-to-weight ratio as well as prevention of seizing

and resistance to scoring. Photographs.
(T24, L26, Al)

103-T. (Russian.) Study of Cast-Iron Parts of Foreign Automobiles. D. P. Glukhov. *Liteinoe proizvodstvo,* no. 12, Dec. 1955, p. 9-12.

Camshafts, valves, crankshafts, flywheels, pistons and rings of American cars studied for microstructure (graphite form, amount of ferrite, grain size), hardness, and influence of chromium, copper other elements. Table, micrographs.
(T21, M27, Q29, CI)

104-T. Liquid-Metal Handling. S. G. Bauer. *Chemical Engineering Progress,* v. 52, Feb. 1956, p. 75F-78F.

Chemical reactivity, leak tightness, pumping, cleaning, and safety are some of the factors to be considered in the use of liquid metals as heat transfer agents. Table, diagrams. (T25)

105-T. Purification of the Rare Gases. D. S. Gibbs, H. J. Svec and R. E. Harrington. *Industrial and Engineering Chemistry,* v. 48, Feb. 1956, p. 289-296.

Fifteen metals and alloys investigated to determine their relative efficacies for removing impurities from a stream of argon or nitrogen. Tables, diagram. 16 ref. (T29, Al, P13, Ba, Ca, CI, Cu, Ce, La, Mg, Th, Ti, U, Zr, Zn)

106-T. Aluminum in Autos. *Light Metal Age,* v. 14, Feb. 1956, p. 21-23.

Survey shows an 18% increase in the use of aluminum in the automotive industry. Tables, photograph. (T21, Al)

107-T. Shell Molded Magnesium Shoe Heels. *Modern Metals,* v. 12, Feb. 1956, p. 35-36, 38.

Development of magnesium heels. Production operation for these stronger, slimmer and cheaper heels. Tables, photographs.
(T10, E16, Mg)

108-T. The Modern Manufacture of Steel Plate for Shipbuilding. T. F. Pearson. *North East Coast Institution of Engineers & Shipbuilders, Transactions,* v. 72, Feb. 1956, p. 157-182.

Various steel plate manufacturing processes as employed in the shipbuilding industry. Photographs, micrograph, diagrams, graphs, table. 5 ref.
(T22, ST)

109-T. Diecastings in the Picture. *Steel,* v. 138, Feb. 13, 1956, p. 95.

Applications of aluminum diecastings in cameras and projectors. Photographs.
(T9, E13, Al)

110-T. Porous Chrome Plating for Wear Resistance. Glenn Pendley. *World Oil,* v. 142, Feb. 1956, p. 98, 100.

Characteristics and oil-field applications of a wear resisting chromium surface which has an unusual affinity for lubrication, promising prolonged bearing and liner service life. Photograph, micrographs.
(T28, L17, Q9, Cr)

111-T. The Application of Materials in Low Temperature Water and Organic Liquid Cooled Reactors. J. E. Draley and S. Greenberg. Paper from "Nuclear Metallurgy". IMD Series Report No. 2. American Institute of Mining and Metallurgical Engineers, Inc. p. 33-53.

The concepts and philosophy underlying choice of materials for a nuclear reactor illustrated in discussions of pertinent materials. Graphs, photograph, tables. 22 ref.
(T25, U, Be, Th, Al)

112-T. Structural Materials for Use in the Pressurized Water Power Reactor. D. M. Wroughton and D. J. DePaul. Paper from "Nuclear Metallurgy". IMD Special Report Series No. 2. American Institute of Mining and Metallurgical Engineers, Inc., p. 55-69.

The nature of pressurized water reactor systems and problems related to materials selection: corrosion, release of corrosion products to the water, radiation effects, wear, mechanical and physical properties, fabrication. Diagrams, graphs, tables. 7 ref. (T25)

113-T. (Book.) Nuclear Metallurgy. R. C. Dalzell, D. H. Gurinsky, R. F. Koenig, E. G. Brush, J. E. Draley, S. Greenberg, D. M. Wroughton, D. J. DePaul, and G. P. Smith. IMD Special Report Series No. 2. 94 p. 1956. American Institute of Mining and Metallurgical Engineers, Inc., 29 West 39th Street, New York 18, N. Y. $3.75.

A report of a symposium covering: application of materials in reactor environments, behavior of materials in aggressive and nonaggressive liquid metals, application of materials in low temperature water and organic liquid cooled reactors, structural materials for use in the pressurized water power reactor, and corrosion of materials in fused hydroxides.
(T25 R6)

114-T. Best Designs for Lead Installations. I. *Chemical Engineering,* v. 63, Mar. 1956, p. 228, 230, 232, 234.

Recommended practice for joining lead sheets and the construction of wood stave tanks, launders, towers

and flues where lead is involved. Graph, diagrams. (To be continued.) (T29, Pb)

115-T. The Role of Nickel and Nickel Substitutes in Jewelry Making. K. H. Mairs and J. M. Williams. *Corrosion,* v. 12, Mar. 1956, p. 31-36.

Type 305 stainless steel showed the least tendency and with the copper-base alloys the greatest tendency toward corrosion. Alloys which develop protective films are more satisfactory than those which do not. Graphs, photograph, table. (T9, R5, Ni SS)

116-T. Use Light Metal Castings for Camera, Projector. *Finish,* v. 13, Mar. 1956, p. 30-31, 59.

Cast aluminum is used to achieve needed compactness and light weight. Photographs. (T9, Al)

117-T. Channel Struts Make Short Work of Construction. W. G. Patton. *Iron Age,* v. 177, Mar. 1, 1956, p. 67-70.

A system combining standardized construction, precision formed interchangeable parts and simplified assembly is achieving some startling results on new construction projects. Roll-formed members are assembled on the job, without any fitting, in less than one-third the usual time. Photographs, diagram. (T26)

118-T. Low Density Structural Laminates. *Mechanical World and Engineering Record,* v. 136, Feb. 1956, p. 83-85.

Applications and constructional features of plywood and other cores faced with steel, stainless steel, aluminum or other metals. Tables. (T26, ST, SS, Al)

119-T. Automakers Take to Aluminum Trim. *Steel,* v. 138, Feb. 27, 1956, p. 110-113.

Applications include grills, wheels, doorsill scuff plates, medallions, roofs and bodies, mostly in bold or silver anodized aluminum, but some in colors. Description of anodizing process. Diagrams, photographs. (T21, L19, Al)

120-T. Silicones in Metalworking. *Steel,* v. 138, Mar. 5, 1956, p. 92-96.

Lists 151 uses for silicones in design, production and maintenance, discusses a few of the more important ones. Photographs. (T5, Si)

121-T. Europe Accepts Food in Tubes. David N. Lewin. *Food Engineering,* v. 28, Mar. 1956, p. 60-61, 157.

Reasons for popularity of tube-packaged foods in Europe. Lists number of foods packaged in this manner. Discusses preparation of foods, protection of quality, coating problems, mechanical filling, in-tube sterilization, space and labor requirements. Photographs. (T10)

122-T. Thorium-Magnesium Sheet Useful for High Temperature Service. Alan V. Levy. *Materials & Methods,* v. 43, Mar. 1956, p. 114-117.

Light weight, strength at elevated temperatures, and good forming properties indicate this alloy applicable for new missiles and aircraft power plants. Corrosion resistance of HK31 alloy summarized. Tables, graphs, diagram, photographs. (T24, R general, Th, Mg)

123-T. How to Lengthen Condenser-Tube Life. H. A. Todhunter. *Power,* v. 100, Mar. 1956, p. 85-87.

Different alloys were tested, 70-30 cupro-nickel condenser tubes showing the least pitting. Photographs, graphs. (T25, Al, Cu, Ni)

124-T. (French.) Refractory Steels and Their Uses in the Construction of High-Temperature Regenerators. P. Villain. *Chaleur & Industrie,* v. 37, no. 366, Jan. 1956, p. 3-10.

Five different chromium steels for the construction of regenerators used by industry for regenerating lost heat, their refractory behavior, creep resistance, stability and weldability. Graphs, tables. (T25, Q3, K9, ST, Cr, Ni)

125-T. (Italian.) Using Sintered Materials in the Automotive Field. E. S. Sgambetterra. *Metallurgia Italiana,* v. 47, special supplement to no. 12, Dec. 1955, p. 27-31; disc., p. 31-32.

Modern processes and equipment; special physical and mechanical properties of some products not obtainable by other means; status in competition with other technologies for manufacture of small metal parts. Photographs, graphs. (T21, H general)

126-T. (Italian.) Researches on the Craterization and New Applications for Hard Metal Tools. C. A. Bertella. *Metallurgia Italiana,* v. 47, special supplement to no. 12, Dec. 1955, p. 35-40.

Review of British and American journal articles on applications of hard metal tools on multiple automatic lathes, flexible spindle machine tools, hand-operated machines, high-speed machines, and helical plate precision milling machines for aircraft parts. Diagrams, micrographs. 15 ref. (T5, G17)

127-T. (Slovak.) Railway Cars for Transporting Oxygen. Pavel Hrbal'. *Zvaranie,* v. 4, no. 11, Nov. 1955, p. 329-334.

Types of cars and tanks and connections between tanks; carrying and delivery capacity. Advantages, safety and economy of these special cars compared to truck transport. Diagrams, photograph, table. (T23)

128-T. Stainless vs. Titanium for High Speed Aircraft. R. G. Sloan, *Materials & Methods,* v. 43, Apr. 1956, p. 124.

Precipitation hardening stainless steels and titanium alloys can meet the severe conditions of supersonic flight. Comparison of strength-weight characteristics indicates their relative suitability for such applications. Photograph. (T24, Q23, SS, Ti)

129-T. Selection and Application of Spring Materials. Harold C. R. Carlson. *Mechanical Engineering,* v. 78, Apr. 1956, p. 331-334.

Data on spring steels (carbon, alloy and stainless), and copper-base, nickel-base, and special alloys which should simplify choice. Tables, graph. (T7, SG-b, ST, AY, SS)

130-T. New Gas Turbine Alloy. (Digest of "Engineering Requirements for Jet Engine Materials", by D. K. Hanink, F. J. Webbere and A. L. Boegehold; presented at Society of Automotive Engineers meeting, Jan. 1955.) *Metal Progress,* v. 69, Apr. 1956, p. 132, 134, 136.

New nickel-base high-temperature alloy which has higher strength and lower content of strategic alloying elements than other turbine-blade alloys. Graphs. (T25, Ni)

131-T. Taming Supersonic Heat. *Steel,* v. 138, Apr. 9, 1956, p. 112-114.

Development of special molybdenum, magnesium and titanium alloys, refractory and oxidation resistant coatings and reinforced plastics for application in guided missiles and supersonic aircraft. Graphs, photographs. (T24, Mg, Ti, Mo)

132-T. Modelling in Pewter Sheet. *Tin and Its Uses,* 1956, no. 34, p. 1-3.

Tools and methods used in making ornaments, trinket boxes and jewelry, from pewter foil. Photographs. (T10, Sn)

133-T. Best Designs for Lead Installations. IV. M. M. Hoover. *Chemical Engineering,* v. 63, May 1956, p. 226-230.

Recommended practice for the fabrication of high-velocity coolers, homogeneous lead linings and lead specialties for use with corrosives. Diagrams. (T29, Pb)

134-T. Arctic Ice Barrier "Crashed" With Nickel-Aluminum Bronze Propellers. J. S. Vanick. *INCO,* v. 26, Mar. 1956, p. 2-6.

New material resists corrosion, has high strength with less weight. Photographs, tables. (T22, Cu)

135-T. Ductile Cast Iron Proves Itself in Kennedy Valve Tests. *INCO,* v. 26, Mar. 1956, p. 12-15.

Standard 6-in. valve bodies tested in bending at 900° F., and under drop-impact tests at 40° F. Photographs. (T7, Q5, Q6, CI)

136-T. Materials Handling at High Temperature Mechanized With Cast High Nickel Alloy Heat-Treating Parts. *INCO,* v. 26, Mar. 1956, p. 26-29.

Diversified operations illustrate how modern high-volume heat treating practice is being mechanized with the aid of high-alloy castings; carburizing, normalizing, hardening, annealing. Photographs. (T5, A5, J general, Ni)

137-T. Alloy Steels Extend Machine Tool Service Life. R. T. Hook. *Iron Age,* v. 177, Apr. 26, 1956, p. 101-103.

Nickel alloy steels for highly stressed turret lathe components; chief use is for parts that need core toughness under a hard case. Diagrams. (T5, AY)

138-T. Practical Selection Data for Sleeve Bearing Materials. J. B. Mohler. *Machine Design,* v. 28, May 3, 1956, p. 105-107.

Tabulated data of known properties of existing bearing materials. Graph, photograph, tables. (T7)

139-T. Magnesium Makes Better Motors. J. T. Howes. *Modern Metals,* v. 12, Apr. 1956, p. 46, 48.

Significant savings in weight, metal cost and machining time result from company's switch from aluminum and zinc. New hot chamber machine die-casts 600 end frames per hour. Photographs, tables. (T1, E13, Mg)

140-T. Aluminum for Marine Switchgear. H. F. Harvey, Jr., and E. J. Dawson. *Power Apparatus and Systems,* 1956, no. 23, Apr. 1956, p. 134-140; disc., p. 140-142.

Advantages of the use of aluminum; comparisons; problems involved in its application to switchgear. 6 ref. (T1, Al)

141-T. (French.) **Light-Alloy Honeycomb and Application to Sandwich Construction.** *DOCAERO; Revue Documentaire de la Technique Aéronautique Mondiale,* 1956, no. 37, p. 39-56.

Composition, production and inspection of light-alloy honeycomb and metallic sandwiches; mechanical characteristics. Diagrams, photographs, tables, 10 ref. (T24, T26, Q general)

142-T. (Polish.) **Bimetallic Bearing Strips: Steel-CuSn4Zn4Pb2.5.** S. Balicki. *Prace Instytutow Ministerstwa Hutnictwa,* v. 8, no. 1, 1956, p. 40-42.

Principles of production of steel-bronze bimetallic strips; cold working, consisting of cold rolling, interoperational annealing, and pickling. Micrographs, diagram. 5 ref. (T7, ST, Cu)

143-T. The Development of Metal-Bonded Carbon Bearings. Harvey B. Nudelman, Cord H. Sump and Walter C. Troy. *ASTM Bulletin,* 1956, no. 213, Apr. 1956, p. 62-69.

A new metal-bonded carbon bearing was developed to combine the desirable properties of carbon and metallic materials. Emphasis was placed on the interpretation of wear technology in bearing research. Photographs, tables, graphs, micrographs. 15 ref. (T7, Q9, C)

144-T. Metallurgy of Automatic Transmission Gears. William G. Mertens and Frank Zuzich. *Automotive Industries,* v. 114, May 1956, p. 66-70, 102.

Raw materials, heat treatment and physical properties of various types of gears; future developments. Tables, photographs. (T21)

145-T. Applications of Aluminum Impacts. Bernard F. Wade. *Electrical Manufacturing,* v. 57, May, 1956, p. 95-99.

Designers have extended the use of these versatile parts to a wide range of electrical and electronic assemblies. Design highlights and several new applications. Diagrams, photographs, tables. (T1, G5, Al)

146-T. High-Temperature, Foil-Type Tantalum Capacitors. David B. Peck, Stanley W. Bubriski and Walter W. Schroeder. *Electrical Manufacturing,* v. 57, May, 1956, p. 134-135, 364.

Developed for reliable continuous operation at 125° C. Design calls for a rolled tantalum-foil capacitor section, impregnated with a non-aqueous, organic-type electrolyte, sealed in a tubular aluminum housing with a special Teflon-rubber triple-spun gasket. Graphs, photographs, table. (T1, Ta)

147-T. Feasibility Survey of Zirconium and Alternate Reactor Structural Materials for High Temperature Operation. S. H. Bush and R. K. Kemper. *Hanford Atomic Products Operation (U. S. Atomic Energy Commission),* AECD-3788, Nov. 1953. 40 p.

Zirconium, aluminum and steel compared on the basis of 100, 200, 300 and 700 Area problems. Zirconium or Zircaloy-2 appear to be the most satisfactory materials for tubes in a high-temperature high-pressure reactor. Graphs, tables. 36 ref. (T25, Al, Fe, Zr)

148-T. Nondefense Uses of Titanium. L. J. Barron. *Light Metal Age,* v. 14, Apr. 1956, p. 16-19.

Good corrosion resistance leads to applications in the food, paper, power, marine, automotive and anodizing industries. Photographs. (T general, Ti)

149-T. Meehanite Metal as a Gear Material. C. R. Austin. *Pulp and Paper Magazine of Canada,* v. 57, Apr. 1956, p. 131-135.

Nature of meehanite metal, properties, response hardening by quenching in water, dimensional stability; industrial applications. Diagrams, graphs, photographs, tables. (T7, CI)

150-T. Some Sheet and Bucket Materials for Jet-Engine Application at 1600° F. and Higher. J. P. Denny, L. P. Jahnke, E. S. Jones and F. C. Robertshaw, Jr. Paper from "Symposium on Metallic Materials for Service at Temperatures Above 1600° F." American Society for Testing Materials, p. 3-15.

Data on mechanical properties, physical constants, and surface and structural stability, which are believed to be representative of the highest caliber of materials currently available. Graphs, tables. 1 ref. (T24, SG-h)

151-T. (Book.) **Steel Extrusion Experiments on Airframe Components. Phase IV Report.** K. A. Wilhelm. 21 p. + 39 plates. 1955. Lockheed Aircraft Corp., Burbank, Calif.

Industrial practice in the production of steel and titanium extrusions for airframe components; production and procurement problems affecting both user and producer. (T24, F24, ST, Ti)

152-T. Porous Metal Filters. Edward D. Kane. *Applied Hydraulics,* v. 9, May 1956, p. 76-77.

Their application for a high degree of oil filtration in hydraulic servomechanisms. Graph, photographs. (T7)

153-T. What's Titanium's Future in Aircraft Hydraulic Circuits? Don F. Collins. *Applied Hydraulics,* v. 9, May 1956, p. 124, 126, 128.

Investigation to determine whether titanium would provide a solution to the problem of high temperature and increased system pressures. Photographs, tables. (T7, T24, Ti)

154-T. Zirconium Alloys for Nuclear Reactor Applications. A. D. Schwope and W. Chubb. *Battelle*

Memorial Institute (U. S. Atomic Energy Commission), BMI-751, June 1952, 22 p.

A number of binary and ternary zirconium-base alloy systems investigated in an attempt to develop a zirconium alloy for nuclear reactor applications. Tensile, hot hardness, corrosion, and heat treating properties determined. Tables.
(T25, Q23, R general, J general, Zr)

155-T. The Selection of Materials for Some Petroleum Refinery Applications. J. F. Mason, Jr. *Corrosion,* v. 12, May 1956, p. 199-206.

Extensive tabulated data with accompanying discussions are devoted to quantitative information on the performance of various ferrous and nonferrous alloys in refinery service. Photograph, tables. 3 ref.
(T29, R7)

156-T. Processing Under Extreme Conditions. Selection of Alloys for Service Requirements. James W. Freeman and Howard R. Voorhees. *Industrial and Engineering Chemistry,* v. 48, May 1956, p. 861-871.

Principles of using available data to select alloys for vessels for extreme pressure at elevated temperature. Tables, graphs, 17 ref. (T26)

157-T. Aluminum Heat Exchangers. Tomorrow's Top Market for Tubing? *Modern Metals,* v. 12, May 1956, p. 35-36, 38.

Aluminum's low cost, light weight, corrosion resistance, and high-thermal conductivity promise big volume use in petroleum, chemical and the process industries. Table, photographs. (T29, Al)

158-T. Aluminum in the Consumer Industries in India. N. R. Srinivasan. Paper from "Directory of Aluminum". The Electrochemical Society, p. 20-24.

An account of the uses of aluminum in industries such as transport, utensils, cables and conductors, extrusions, foil, powder and paste and chemicals. Tables. 11 ref. (T general, Al)

159-T. (German.) **Cutting and Shaping Tools for Small Production in a Punching Shop.** Ernst Vergen. *Zeitschrift für Metallkunde,* v. 47, no. 4, Apr. 1956, p. 217-220.

Examples show how to manufacture cutting and shaping tools at low cost for small production runs. Diagrams, photographs.
(T5, G general)

160-T. (Czech.) **Sintered Machine Parts as Replacements for Castings and Forgings.** V. Prochazka. *Strojirenstvi,* v. 6, no. 3, Mar. 1956, p. 209-211.

General principles for selecting sintered parts; economic factors involved in their application; main qualities of metallic powders used for manufacturing sintered parts. Table, diagrams, photographs. 3 ref. (T7, H general)

161-T. (French.) **Orienting the Builder on the Selection of Cast Metals.** Raymond Chavy. *Fonderie,* no. 123, Apr. 1956, p. 133-142.

Examines different properties that should be required in cast metals and alloys; classification of different ferrous and nonferrous alloys; application to machine-tool frames, a truck engine housing, and cast gears. Tables. (T7)

162-T. Materials. *Aviation Age,* v. 25, June 1956, p. El + 21 pages.

Research and development trends, high-strength and temperature steels, new aluminum alloys, high-temperature chemicals, thermal limits of metals and nonmetals, product and data reviews. (T24)

163-T. Cast Beryllium-Copper Forging Dies. Clyde L. Frear. *Bureau of Ships Journal,* v. 2, June 1956, p. 6-8.

Molding practice, melting, economic and other advantages. Diagram, photographs.
(T5, E general, Be, Cu)

164-T. Zirconium-Copper Raises Level of Commutator Performance. Webster Hodge and Paul W. Nippert. *Electrical Manufacturing,* v. 57, June 1956, p. 95-97, 354.

New alloy shows high conductivity, superior strength at elevated temperatures plus freedom from notch sensitivity and the ability to form and maintain a permanent commutation film. Tables, diagrams, photograph. 6 ref. (T1, Cu, Zr)

165-T. First Zirconium Vessel for HRT Reactor. G. E. Elder, E. C. Miller, L. F. Bledsoe and F. V. Daly. *Journal of Metals,* v. 8, May 1956, p. 648-650.

Hot forming of complicated shapes reduced number of welds. Project speeded by development of equipment and techniques to permit welding in the open. Diagrams, photographs. 6 ref.
(T25, K general, Zr)

166-T. Aluminum Chain. H. F. Reid, Jr. *Materials & Methods,* v. 43, June 1956, p. 124-125.

Aluminum chain assemblies are particularly suitable in industries where corrosion resistant, nonsparking, nonmagnetic properties are required. Graph, table, photographs. (T7, Al)

167-T. Redesigning for Malleable Iron Castings. D. B. Fulton, J. R. Entenmann and T. J. Kirby. *Materials & Methods,* v. 43, June 1956, p. 140-142.

Case histories show how malleable can replace other materials where toughness or low cost are needed. Photographs, table. (T general, CI)

168-T. Applications of Investment Castings. *Metal Progress,* v. 69, June 1956, p. 132, 134, 136-138, 140, 142.

Digest of five papers covering improvements and economies, design factors, castability, quality control and inspection as they relate to fields of application. (T general, E15)

169-T. (German.) **Metallurgical Problems in Construction of Reactors.** *Zeitschrift für Metallkunde,* v. 47, no. 5, May 1956, p. 267-281.

Design and operation of the various structural elements of a reactor. Problems presented by the materials used, such as the fissionable material, construction material, moderator and reflector, cooling agent and control rods. Micrographs, photographs, tables, diagrams, graphs. 70 ref. (T25)

170-T. (Russian.) **Experimental Use of Cold-Rolled Electrotechnical Steel in Electric Machines.** D. V. Lokshin and Z. B. Neiman. *Elektrichestvo,* no. 5, May 1956, p. 46-50.

Advantages of cold rolled steels over high-alloy hot rolled steels for use in construction of electric machines. Best results are achieved when the direction of the magnetic flow is made to coincide with the direction in which the steel has been rolled. Diagrams, photograph, graphs. (T1, P16, ST)

171-T. Use of Zirconium in Liquid-Sodium Systems. F. E. Bowman and D. D. Cubicciotti. *A.I.Ch. E. Journal,* v. 2, June 1956, p. 173-176.

Attractive nuclear properties of zirconium make it a highly desirable core material for sodium-cooled reactors. Primary problem is control of oxygen, hydrogen and nitrogen impurities in sodium. (T25, Zr)

172-T. Chrysler Uses Up to 80 Lb. of Aluminum Per Car. *Automotive Industries,* v. 114, June 15, 1956, p. 70-71.

Tabular presentation of aluminum components in Chrysler automobiles. (T21, Al)

173-T. Tantalum Heat Exchangers and Haveg Tank Do the Job. Frank E. McElroy and Herbert H. Dorer. *Chemical Processing,* v. 19, July 1956, p. 52-55.

Reaction tank and steam heaters must withstand conditions of reaction with 32% hydrochloric acid at 75 to 80° C. (T29, Ta)

174-T. Highest Filtration Throughout Per Dollar of Investment. *Chemical Processing,* v. 19, July 1956, p. 70-71.

Stainless steel vertical pressure-leaf filter handles corrosive phosphoric acid with maximum operating economy. (T29, SS)

175-T. Steel Castings for Aircraft Challenge the Foundry Industry. Harold E. Simmons. *Foundry,* v. 84, July 1956, p. 88-90.

Some basic considerations for potential producers of aircraft quality castings. (T24, E general, CI)

176-T. Nuclear Industry Wants Better Steels. R. C. Dalzell. *Iron Age,* v. 177, June 21, 1956, p. 112-114.

Requirements for steels used by nuclear industries. (T25, ST)

177-T. More About Metal Honeycomb. J. D. Green. *Light Metals,* v. 19, June 1956, p. 186-187.

Application of aluminum honeycomb to aircraft. (T24, Al)

178-T. Titanium in Industry. L. J. Barron. *Modern Metals,* v. 12, June 1956, p. 35-36, 38.

Despite high cost, titanium's corrosion resistance makes it an economical material in many chemical and food processing applications. (T29, R general, Ti)

179-T. Tests Runs Start . . . Lightweight Trains Rolling. Kim Darby. *Modern Metals,* v. 12, June 1956, p. 50 + 5 pages.

Railroads are testing lightweight passenger trains that are much cheaper to buy and operate than conventional equipment. Much aluminum is used. (T3, Al)

180-T. Die Cast 6-Cylinder Engine Block. Alfred F. Bauer. *Modern Metals,* v. 12, June 1956, p. 72 + 6 pages.

Aluminum die cast block is cheaper to produce and machine and gives more efficient operation. It weighs 143 lb. less than iron. (T21, D13, Al)

181-T. Use and Properties of Extruded High-Strength Aluminum for Electric Bus Conductors. W. Switney and C. L. Carlson. *Power Apparatus and Systems,* no. 24, June 1956, p. 449-451; disc., p. 452-453.

Current-carrying tests on various sizes and configurations of bus bars made of new alloy give data for its application as a bus conductor for electric equipment. (T1, P15, Al)

182-T. Non-Defense Uses of Titanium Metal. L. J. Barron. *Steel Processing,* v. 42, June 1956, p. 333-335.

Strength-weight and corrosive service applications; economics of titanium use; applications in process industries; anodizing. (T general, Q23, R general, J23, Ti)

183-T. Shipbuilding and the Steel Industry. A. Turner. *Steel Review,* nos. 3-6, Apr. 1956, p. 41-46.

Analysis of steel requirement trends. (T22, A4, ST)

184-T. Aluminum and Aluminum Alloys for Pressure Vessels. Marshall Holt. *Welding Journal,* v. 35, June 1956, p. 308S-312S.

Characteristics of materials available; design rules and problems; fabrication processes. (T25, Al)

185-T. Welded Inconel Salt Pot Increases Service Life, Slices Heat Treater Costs. H. W. Hiemke. *Western Metals,* v. 6, June 1956, p. 60-61.

Fabrication of salt pots which cost only .05 per hr. of operation. (T5, K1, Ni-e)

186-T. Use of Castings in a Modern Iron and Steel Works. W. F. Cartwright. *Foundry Trade Journal,* v. 100, June 14, 1956, p. 443-450.

Mechanical properties of cast iron, factors influencing choice of material for a particular job, development of uses for nonferrous castings. (T5, E general, Q general, EG-a, CI)

187-T. Cast Steel Work Rolls in Hot Strip Mill Finishing Stands. F. H. Allison, Jr. *Iron and Steel Engineer,* v. 33, June 1956, p. 98-99.

Operating experience hints that accumulated heat and temperature are some basic factors leading to selection of steel over iron work rolls. (T5, F23, CI)

188-T. (French.) **Applications of the Napier "Deltic" Diesel Engine.** *Revue de l'Aluminium,* v. 33, no. 231, Apr. 1956, p. 371-378.

Characteristics and performance of the 18-cyl., 36-piston engine. Casings are of light alloys which lead to a very high-power weight ratio. (T21, EG-a)

189-T. Tantalum Solid Electrolytic Capacitors. D. A. McLean and F. S. Power. *I.R.E., Proceedings,* v. 44, July 1956, p. 872-878.

Advantages include small volume, absence of the necessity for a hermetic seal, flexibility as to shape, superior temperature characteristics, relatively low power factor and indefinitely long shelf life. (T1, Ta)

190-T. New Alloys for Automotive Turbines. D. N. Frey. *SAE Journal,* v. 64, July 1956, p. 33-36.

Three new classes of strong, nonstrategic, low-cost, high-temperature alloys are being developed for use in ground vehicle gas turbines. (T25, SG-h)

191-T. Save With Shaped Wire. *Steel,* v. 139, July 16, 1956, p. 132-315.

Illustrates cold drawn special shapes which conserve raw materials, reduce or eliminate machining and serve as preformed stock with improved machinability and wear resistance. (T7, G17, Q9)

192-T. Electro-Zinc Coated Steel Sheet and Strip. D. A. Winton. *World Refrigeration and Air-Conditioning,* v. 7, June 1956, p. 319-320, 322.

The coated product can be formed with ease and is completely protected from corrosion during storage and at all stages of fabrication. (T27, Zn, ST)

193-T. (French.) **The Frenger Thermo-Acoustic Ceiling.** *Revue de l'Aluminium,* v. 33, no. 232, May 1956, p. 503-506.

Permits low-temperature radiant heating, cooling, soundproofing and ventilation. (To be continued.) (T26, Al)

194-T. (German.) **Light Alloys for Bus Bodies.** E. Zahn. *Aluminium,* v. 32, no. 7, July 1956, p. 417-422.

Weight effects on the earning capacity of buses. Economy of more light alloys in buses. (T21, Al)

195-T. (German.) **Sintered Metals in Electrotechnics.** Rudolf Palme. *Elektrotechnische Zeitschrift,* v. 8, Part B, no. 6, June 1956, p. 233-238.

Application of sintered tungsten, molybdenum and tantalum in electric heating equipment, and X-ray and electronic tubes. (T1, H general, W, Mo, Ta)

196-T. (German, French.) **"Aluman" Roofing.** W. Kulli. *Aluminium Suisse,* v. 6, no. 3, May 1956, p. 97-102.

Description of complicated work involved in application of an aluminum alloy as a roofing material. (T26, Al)

197-T. Choosing Materials for Instrument Manufacture. P. Mabb. *Corrosion Technology,* v. 3, July 1956, p. 217-220, 232.

Some aspects of the care required to prevent contamination of components and quality standards. Use of insulating papers, welding, brazing and soldering. (T8, K1, K7, K8)

198-T. Metal Power Rectifiers With Particular Reference to the Develop-

ment of Germanium and Silicon. James Stweart. *Electroplating and Metal Finishing,* v. 9, July 1956, p. 212-219, 235.

Production, characteristics and advantages in electroplating installations. (T1, L17, Ge, Si)

199-T. Germanium Power Rectifiers. *Ericsson Review,* 1956, no. 1, p. 24-26.

Produced in three types, the units are of small size in comparison with conventional copper and selenium-type rectifiers. With the new elements it is possible to design rectifier units of smaller dimensions and higher efficiency. (T1, Ge)

200-T. Aluminium Hoppers and Chutes for C.E.A. *Light Metals,* v. 19, July 1956, p. 203-204.

Use of light metals for power station coal chutes prevents blockage. (T25, Al)

201-T. The Utilization of Strip Material in Presswork. *Mechanical World and Engineering Record,* v. 136, July 1956, p. 326-327.

Important factors in design of blanking tools are the grain in the material and economy achieved in using the strip. (T5)

202-T. Margin of Victory—Magnesium. *Modern Metals,* v. 12, July 1956, p. 74-75.

Extra light-weight race car gained faster acceleration and braking. Reduced weight permitted larger fuel tank. (T21, Mg)

203-T. Rock-Bit Design, Selection and Evaluation. I. How Metals Are Chosen for Rock Bits. H. G. Bentson. *Oil and Gas Journal,* v. 54, July 23, 1956, p. 110.

Variation in properties of bit types is accomplished by varying certain factors within the limitations imposed by metallurgy, bit diameter and established criteria. (T28, AY)

204-T. Beryllium-Copper Dies. *Steel,* v. 139, July 30, 1956, p. 116-117, 120.

Beryllium-copper resists corrosion, wears well, is nonsparking and nonmagnetic, has excellent casting qualities, is hard and strong and conducts heat well. Dies are cheap to make, can be remelted and used again. (T5, Be, Cu)

205-T. New High Temperature Alloy for Radiant Tubes in Continuous Annealing Furnaces. *Steel Processing,* v. 42, July 1956, p. 407-408.

Alloy NA22H permits increased furnace capacity and efficiency by increasing rate of heating with higher heat heads, practical engineering design to 2200° F., and longer alloy life per dollar invested. (T5, J23, SG-h)

206-T. Six Advantages of Wire in Product Design. T. W. Whipple. *Wire and Wire Products,* v. 31, July 1956, p. 763-764, 810, 811.

The future of wire product design. (T10)

207-T. (Czech.) Effect of Macrostructure on the Service Life of Cast-Iron and Hardened Rolls Used for the Cold Rolling of Sheet Metal. Miloslav Sourek. *Hutnik,* v. 6, no. 4, Apr. 1956, p. 113-117.

Tests to determine nature and depth of hardened layer, criteria of good rolls, effect of composition of steel rolls, certain elements and impurities, stresses developed during solidification and thickness of hardened layer. (T5, F23, M28, S21, ST, CI)

208-T. (German.) Aluminum in Shipbuilding. R. Pertusini. *Aluminium Ranshofen, Mitteilungen,* v. 4, no. 1, Apr. 1956, p. 10-14.

Possible uses of light metals and alloys in shipbuilding for inland navigation. Uses in ship hulls, superstructures and fixtures. (T22, Al)

209-T. (German.) Importance of Aluminum in Reactor Building. II. Fritz Regler. *Aluminium Ranshofen, Mitteilungen,* v. 4, no. 1, Apr. 1956, p. 18-22.

Various uses of aluminum in reactors. Advantageous nuclear properties include excellent malleability and good heat conductivity, as well as good corrosion resistance and mechanical strength at low temperatures. Owing to its low melting point, however, the use of aluminum in reactors is limited to lower temperatures. (T25, Al)

210-T. New Uses for Magnesium Die Castings. *Automotive Industries,* v. 115, July 15, 1956, p. 62-63.

Tabulated data show weight and cost advantages. (T21, Mg)

211-T. Nickel in World Coinage. A. S. Tuttle. *Canadian Metals,* v. 19, July 1956, p. 30-32, 34.

Choice of an alloy for coinage; ancient and modern minting procedures. (T10, Ni)

212-T. Resists Carburization at 1750° F. *Chemical Processing,* v. 19, Aug. 1956, p. 14-17.

Incoloy is shown to be equal or superior to other alloys used for furnaces in the field of ethylene manufacture. (T29, Ni)

213-T. Welded Structures in Cranes and Mill Equipment. I. W. Evans. *Iron and Steel Engineer,* v. 33, July 1956, p. 105-108; disc., p. 108-110.

Reasons for increase in welding applications; some views on the subject of riveted girders versus welded girders. (T5, K1)

214-T. Sintered Steel—for High Shear Strength Service. John D. Howell. *Precision Metal Molding,* v. 14, Aug. 1956, p. 51, 56.

Oil-impregnated Super-Oilite spline inserts for drill press shafts give satisfactory performance. (T7, ST)

215-T. They Use 70 Castings in 4 Alloys in This Modern Duplicator. *Precision Metal Molding,* v. 14, Aug. 1956, p. 42-44.

Machine designed to take full advantage of an effective range of properties and characteristics available from die and permanent mold castings. (T9, E12)

216-T. Facts About Stainless Steel Drainage. W. E. McFee. *Heating and Air Conditioning Contractor,* v. 47, July 1956, p. 48-51.

Components used in a roof drainage system, with the accent on stainless steel applications. (T26, SS)

217-T. Advances in Gas Turbine Materials. Julius J. Harwood. *Aero Digest,* v. 73, Aug. 1956, p. 20-27.

Review shows that mere improvement of presently used alloying systems is not sufficient and that more imaginative approaches are necessary. (T25)

218-T. Use of Die Castings in Cars Increased by Optional Features. Thomas MacNew. *Automotive Industries,* v. 115, Aug. 1, 1956, p. 56-59.

Uses and possible uses of aluminum, magnesium and zinc die castings in cars. (T21, Mg, Zn, Al)

219-T. Oriented Steel and Today's Turbine Generators. J. W. Staats. *Blast Furnace and Steel Plant,* v. 44, Aug. 1956, p. 940-942, 944.

Mechanical and electrical properties. Advantages include decreased machine losses and heating. (T25, Q23, P15, SG-p)

220-T. Materials for Nuclear Power Reactors. John M. Warde. *Materials & Methods,* v. 44, Aug. 1956, p. 121-144.

Materials selection factors, properties of available materials that can be or have been used in reactors, coolants and nuclear fuels. (T25)

221-T. Spring Materials for High Temperature Service. *Product Engineering,* v. 27, Aug. 1956, p. 186-193.

Data on relaxation and creep at temperatures up to 700° F., recommended design stresses for nickel alloys for light, medium and severe duty, endurance properties and effect of shot peening. (T7, Q general, SG-b)

222-T. (French.) **Tubing No. 80 in Special Steel Produced in France to Resist Cracking Corrosion Caused by Gas Existing at Lacq of High Hydrogen Sulphide Content.** L. Cauchois, J. Didier and E. Herzog. *Corrosion et Anticorrosion,* v. 4, no. 5, May 1956, p. 157-165.

Because of difficult operating conditions at Lacq this special steel tubing, which is more resistant than the usual type, is in use. Corrosion tests are in progress. (T29, R1, SG-g)

223-T. (French.) **Aluminium-Steel Contact Wires.** Louis Albert. *Revue de l'Aluminium,* v. 33, no. 233, June 1956, p. 615-619.

Use of aluminium-steel wires in trolley contact lines. Notes that performance is superior to copper. (T1, ST, Al)

224-T. (Norwegian.) **Building Construction With Aluminum.** Arne Selberg. *Teknisk Ukeblad,* v. 103, no. 27, July 4, 1956, p. 609-617.

Properties and possibilities of application of aluminum and aluminum alloys in buildings. (T26, Al)

225-T. (Russian.) **An Experiment in Using Austenitic Steels in Boiler Plants Operating at Ultra-High Temperatures and Pressures (600° C. and 300 Atmospheres).** In Lagunstov. *Teploenergetika,* v. 3, no. 8, Aug. 1956, p. 39-43.

Tests on heat resistant steel EI257 indicate that it is not suited for use with ultra-high steam pressures and temperatures because of intercrystalline corrosion and other defects arising during use. Chemical composition. (T25, R2, AY)

226-T. (Russian.) **Pipes Made of Heat Resistant Alloy.** V. S. Mikheev. *Vestnik Akademii Nauk SSSR,* v. 26, no. 27, July 1956, p. 40-42.

Pipes made of an aluminum-chromium-iron alloy which has high melting point (1500°), is heat resistant almost to its melting point and is sufficiently tough at the temperatures used for pyrolysis of hydrocarbons. (T29, AY)

227-T. New Blading Alloy Improves Turbine Performance. P. M. Unterweiser. *Iron Age,* v. 178, Sept. 6, 1956, p. 100-101.

Metallurgical research has produced a specially designed material which has high strength and ex-

cellent damping capacity, even at 1200° F. (T25, Ni, Cr, Fe, Co)

228-T. (Russian.) **Selecting Metals and Alloys for the Fuel Systems of Engines.** A. A. Gureev and Z. A. Sablina. *Avtomobil'naia i Traktornaia Promyshlennost',* no. 6, June 1956, p. 23-24.

Gum formation in gasoline engines can be affected by certain metals and alloys used in constructing the combustion chamber and fuel system. (T21)

229-T. (Book.) **Nuclear Fuels.** David H. Gurinsky and G. J. Dienes, editors. 364 p. 1956. D. Van Nostrand Company, Inc., 120 Alexander St., Princeton, N. J. $7.50.

Compact picture of present status of nuclear fuels. Organized in three sections; metallurgy of uranium and thorium; radiation effects; solid and fluid fuels. Provides engineering principles and applications of specific systems. (T25, Th, U)

230-T. (Book.) **Progress in Nuclear Energy. v. I. Process Chemistry. Series III.** F. R. Bruce, J. M. Fletcher, H. H. Hyman, and J. J. Katz, editors. 407 p. 1956. Pergamon Press Ltd., 4 & 5 Fitzroy Square, London, W.1, England.

Selected papers on analytical, separating, and metallurgical processing methods employed by major countries in their atomic energy programs. (T25, C general, U, Th)

231-T. (Book.) **Progress in Nuclear Energy v. I. Technology and Engineering. Series IV.** R. Hurst and S. McLain, editors. 420 p. 1956. Pergamon Press Ltd., 4 and 5 Fitzroy Square, London, W.1, England.

Heavy-water production processes; production and properties of graphite and beryllia; liquid metals; heat transfer, reactor chemistry and corrosion of reactor materials. (T25, R general)

232-T. (Book—German.) **Aluminum Beam Structure.** Fritz Stüssi. 198 p. 1955. Springer-Verlag, Berlin.

Construction material and its properties. Joint materials. Special strength problems and stability problems. Construction of aluminum structures. (T26, Al)

233-T. Turbine Disks for Jet Propulsion Units. A. E. Johnson. *Aircraft Engineering,* v. 28, Sept. 1956, p. 325-332.

A report on results of thermal conductivity, thermal expansion, tension and torsion, relaxation, reversal of strain and overstrain and fatigue tests on numerous disk materials. (To be continued.) (T25, P11, Q general, SG-h)

234-T. Economic Atomic Power Depends on Materials of Construction. John H. Frye, Jr., and James L. Gregg. *Metal Progress,* v. 70, Sept. 1956, p. 92-96, 96B.

With necessary materials and low-cost uranium refining methods, a breeder reactor using uranium isotope-233 and a thorium blanket can generate heat at costs comparable with steam boilers using coal. (T25, U, Th, Al, Zr)

235-T. Materials in the Automobile of the Future. A. L. Boegehold. *Metal Progress,* v. 70, Sept. 1956, p. 103-109.

The future car will be no smaller but will weigh less. A more efficient, more powerful spark ignition gasoline engine will persist. (T21)

236-T. The Light Metals in American Economy. Francis C. Frary. *Metal Progress,* v. 70, Sept. 1956, p. 128-132.

Only 10% of U. S. aluminum went into aircraft in 1955; the largest single use of magnesium is as an alloying metal. Post-war applications reviewed. (T general, Al, Mg)

237-T. (German.) **Steels for High-Temperature Service in Steam Generator Construction.** G. Krüger. *Energietechnik,* v. 6, no. 8, Aug. 1956, p. 368-374.

Possibilities of use at higher temperatures and with more deformation resistance. Embrittlement and weld decay in poor alloy steels; steels for sheets, tubes and screws for temperatures up to 400 and 600° C., austenitic steels. Need for long-duration examination. (T25, Q23, AY)

238-T. (German.) **Materials for Producing Dental Plates From Chromium-Nickel-Steel, Cobalt-Chromium-Molybdenum Alloy, and a Cobalt-Chromium Alloy With Nickel Added.** W. Tofaute. *Technische Mitteilungen Krupp,* v. 14, no. 3, Aug. 1956, p. 54-59.

Mechanical and physical properties and corrosion behavior of the above alloys. (T10, P general, R2, Cr, Ni, Co, Mo, Ay)

239-T. (German.) **Beryllium.** R. Reinbach. *Vakuum-Technik,* v. 5, no. 5, Aug. 1956, p. 100-103.

Short study of beryllium and its technical applications for atomic moderators and reflectors. Beryllium bronzes. Hardening processes. (T25, J general, Be)

240-T. Aluminum Alloys. R. L. Horst. *Industrial and Engineering Chemistry,* v. 48, pt. 2, Sept. 1956, p. 1696-1701.

Atomic energy applications, atmospheric exposures and ammonium nitrate fertilizers have set the pace for expanding aluminum applications in the process industries during the past year. (T general, Al)

241-T. Selecting Materials for Electrical Contacts. Victor G. Mooradian. *Materials & Methods,* v. 44, Sept. 1956, p. 121-140.

Evaluation of operating conditions, evaluation of life and reliability requirements, properties and applications of basic contact materials and determination of contact design. (T1)

242-T. Trends in Light Metals Uses. Douglas Watson. *Modern Metals,* v. 12, Sept. 1956, p. 50, 52, 54.

Bright outlook for aluminum in electrical, transportation, building, packaging applications, and magnesium in aircraft, materials handling, portable machines, luggage. (T general, Al, Mg)

243-T. How to Choose Anti-Friction Bearing Materials. John Preston, Jerome Mogul and George Fioroff, *SAE Journal,* v. 64, Sept. 1956, p. 56-59.

Six questions to be answered for proper selection. (T7)

244-T. (Czech.) Production of Spheroidal Iron Rolls for Rolling Mills. Otto Necas. *Slévarenstvi,* v. 4, no. 8, Aug. 1956, p. 237-243.

Process permits production of spheroidal rolls of weights up to 25 tons. (T5, E general, CI)

245-T. (German.) The Titanium Problem From the Viewpoint of the Hungarian Vacuum Tube Industry. I. Koncz. *Acta Technica Academiae Scientiarum Hungaricae,* v. 15, no. 1-2, 1956, p. 169-178.

Experiments show that titanium replaces nickel and, in part, molybdenum, for its use makes degassing superfluous, reduces evacuation time, and allows higher vacuum rates to be maintained during operation. (T1, Ti)

246-T. Report on Titanium. S. R. Carpenter. *Metal Treating,* v. 7, Sept.-Oct. 1956, p. 10-12, 53.

Advantages of titanium over stainless steel or light alloys in aircraft manufacture. (T24, Ti)

247-T. (Czech.) Alloy Cast Iron Rollers. Robert Kamensky. *Hutnik,* v. 6, no. 7, July 1956, p. 201-205.

Types and properties. Division of rollers into hard, semihard and soft types according to their composition. (T5, CI)

248-T. Processing and Purification of Silicon for Semiconductor Use. D. K. Hartman and P. L. Ostapkovich. *Metal Progress,* v. 70, Oct. 1956, p. 100-103.

The silicon used in electronic devices must contain less than one part in one hundred million of impurities, and techniques for obtaining such purity have now been developed. (T1, Si)

249-T. Fabricating Consumable Electrodes of Zirconium, Titanium, and Similar Metals for Arc Melting. R. A. Beall, F. W. Wood and P. C. Magnusson. *U. S. Bureau of Mines, Report of Investigations* 5247, July 1956, 25 p.

Fabrication of consumable electrodes by sintering, nippling and welding lightly pressed compacts of scrap metal. (T5, C21, Ti, Zr)

250-T. (French.) Heat Properties of Some Nonferrous Products That Are Usable in Aeronautics. R. Chevigny. *Metaux, Corrosion-Industries,* v. 31, no. 373, Sept. 1956, p. 369-377.

Studies of ordinary aluminum alloys and sintered aluminum and titanium alloys in relation to their use in airplane parts working at average temperatures. (T24, Al, Ti)

251-T. (German and French.) Contact Rails of Sectional Aluminum. G. Dassetto. *Aluminium Suisse,* v. 6, no. 5, Sept. 1956, p. 161-173.

Use of V or L-sections of aluminum or aluminum alloys for the third rail of electric railways using currents up to 1000 amp. Design and fabrication factors. (T1, T23, Al)

252-T. Study of 7% and 8% Chromium Creep-Resisting Steels for Use in Steam Power Plant. M. G. Gemmill, H. Hughes, J. D. Murray, F. B. Pickering and K. W. Andrews. *Iron and Steel Institute, Journal,* v. 184, Oct. 1956, p. 122-144.

Development work on various 7% chromium-base steels of duplex constitution. Metallurgical characteristics of various 8% chromium, 3% molybdenum steels, ferritic at all temperatures. Properties of an 8% chromium - molybdenum - titanium steel. (T25, AY)

253-T. (Polish.) The Application of Cast Iron for Car Wheels. Kazimierz Hess. *Przeglad Odlewnictwa,* v. 6, no. 9, Sept. 1956, p. 268-278.

Results of tests on over 1000 wheels on mining cars or on cranes. (T23, CI)

254-T. (Polish.) **Cast Iron Crankshafts for the Motor Type S42 for the Car Star 20.** Leon Jamroz. *Przeglad Odlewnictwa,* v. 6, no. 9, Sept. 1956, p. 278-286.

Considers design and testing of cast iron crankshafts which in many cases surpass steel in quality. (T21, CI)

255-T. Armament Metallurgy. H. P. Tardif. *Canadian Metals,* v. 19, Oct. 1956, p. 42, 44-45.

Guided missile work, high-strength steels, craze cracking in gun tubes, armor and shaped charge research, metallographic observations. (T2)

256-T. Stainless in Aircraft Design. Edward A. Loria. *Steel,* v. 139, Nov. 5, 1956, p. 142-143.

Data on several new types of austenitic stainless steels. (T24, SS)

257-T. (Hungarian.) **Investigations on the Transition Resistance of Copper and Silver Contacts.** Jozsef Mocsary. *Elektrotechnika,* v. 49, no. 9, Sept. 1956, p. 275-280.

Contact pressure and resistance are related and effects of mechanical vibration are noted. (T1, P15, Ag, Cu)

SECTION V

MATERIALS—

General Coverage of Specific Materials

1-V. New Aluminium-Vanadium-Titanium Alloy. *Metal Treatment and Drop Forging,* v. 22, Oct. 1955, p. 430-431.

Mechanical and high temperature properties, weldability. Photograph, table, graphs.
(Q general, K9, Ti, Al, V)

2-V. Titanium. C. Fred Curnham. *Products Finishing,* v. 20, Nov. 1955, p. 60 + 8 pages.

Present commercial and electrolytic recovery processes, costs, producers, uses, electrodeposition considered. (Ti)

3-V. Plutonium Metal. Eric R. Jette. Paper from "Nuclear Metallurgy". IMD Special Report Series No. 1. American Institute of Mining and Metallurgical Engineers, p. 29-37.

Data released to May 1955, physical and metallurgical properties, equipment for handling it. Photographs, tables. 3 ref. (Pu)

4-V. The Physical Metallurgy of Thorium. H. A. Wilhelm and B. A. Rogers. Paper from "Nuclear Metallurgy". IMD Special Report Series No. 1. American Institute of Mining and Metallurgical Engineers, p. 39-63.

Current interest in thorium is due to its possible use as a source for nuclear fuel. Metallurgical, physical, and mechanical properties presented. Graphs, micrographs, diagram, tables. 82 ref.
(P general, Q general, Th)

5-V. Titanium and Titanium Alloys Programs. v. I, II, and V. 35, 89, and 69 p. 1955. Air Materiel Command, Wright-Patterson Air Force Base, Ohio.

Provides wide dissemination of unclassified information in abstracted form. (Ti)

6-V. (German.) **Cold-Rolled Transformer Steel.** Fritz Stäblein and Hans-Heinz Meyer. *Elektrotechnische Zeitschrift,* v. 7, Ausgabe B, no. 10, Oct. 1955, p. 368-373.

Magnetic properties, methods of production, applications, advantages over hot rolled steel. Graphs, diagrams, photographs. 5 ref.
(P16, T general, SG-p, Fe-q)

7-V. Thorium. James W. Franklin and Daniel P. Eigo. *Engineering and Mining Journal,* v. 156, Nov. 1955, p. 75-77.

Raw material sources, methods of processing, applications, markets and general review of major thorium minerals. Photographs, tables. (Th)

8-V. Nickel-Copper Low Alloy Steels. T. N. Armstrong and J. W. Crossett. *INCO,* v. 26, no. 6, Oct. 1955, p. 12-17.

Composition, mechanical properties, formability, welding and corrosion resistance. Tables, graphs, photographs. (AY)

9-V. Iodide Process Produces Ductile Hafnium for Fabrication. J. G. Goodwin and W. J. Hurford. *Journal of Metals,* v. 7, Nov. 1955, p. 1162-1168.

Melting techniques, ingot quality, forging, strip, rod and wire fabrication extrusion, cold rolling, machining, welding, annealing. Tables, photographs graphs, diagram. 13 ref. (Hf)

10-V. Fabricating Ultra - High Strength Steel. John Dietz and L. H. McCreery. *Product Engineering,* v. 26, Dec. 1955, p. 170-173.

Heat treatment, plating, machining, casting specifications for SAE 4340 steel to assure strength and reliability. Tables, photographs. (AY)

11-V. High-Nitrogen Steels: New Stainless Family. D. J. Carney. *Steel,* v. 137, Nov. 7, 1955, p. 138, 140, 144.

Processing and application of a new austenitic stainless, made without nickel, which is completely austenitic at 2300° F. Key to its stability at high temperatures is a nitrogen content more than double previous limits. Graphs. (SS)

12-V. **The Thorium and Cerium Industries. I. Thorium. II. Cerium.** Norbert Berkowitz. Paper from "Industrial & Manufacturing Chemistry. Pt. II. Inorganic". v. II. Philosophical Library, Inc., p. 327-346.

Natural occurrence, extraction from ores, analysis of minerals, properties, uses. 18 ref. (Ce, Th)

13-V. **Titanium.** Norbert Berkowitz. Paper from "Industrial & Manufacturing Chemistry. Pt. II. Inorganic". v. II. Philosophical Library, Inc., p. 347-353.

Kinds and locations of ores, preparation, properties, utilization of metallic titanium and its compounds. 24 ref. (Ti)

14-V. **Zirconium.** Norbert Berkowitz. Paper from "Industrial & Manufacturing Chemistry. Pt. II. Inorganic". v. II. Philosophical Library, Inc., p. 355-359.

Short review of geographic distribution, extraction and analysis of ores, industrial and other uses, price. Table. 12 ref. (Zr)

15-V. **Tantalum and Niobium.** Norbert Berkowitz. Paper from "Industrial & Manufacturing Chemistry. Pt. II. Inorganic". v. II. Philosophical Library, Inc., p. 361-366.

Location and composition of ores, manufacture, properties, and uses of tantalum, analysis of minerals, estimation of columbium in steels. Table. 3 ref. (Cb, Ta)

16-V. **Tungsten.** Norbert Berkowitz. Paper from "Industrial & Manufacturing Chemistry. Pt. II. Inorganic". v. II. Philosophical Library, Inc., p. 367-372.

Natural occurrence, distribution, extraction from ores, properties, uses of metals, ore analysis. (W)

17-V. **Uranium.** Norbert Berkowitz. Paper from "Industrial & Manufacturing Chemistry. Pt. II. Inorganic". v. II. Philosophical Library, Inc., p. 387-391.

Characteristics, manufacture, uses of metal, treatment of ores, geographic occurrence of radioactive ores. Table. (U)

18-V. **Vanadium.** Norbert Berkowitz. Paper from "Industrial & Manufacturing Chemistry. Pt. II. Inorganic". v. II. Philosophical Library, Inc., p. 393-398.

Two methods of extraction from ores and two methods of analyzing ores and alloys; properties and uses of metal and its compounds. (B general, V)

19-V. **The Lithium Industry.** P. E. Landolt. *Electrochemical Society, Journal,* v. 102, Dec. 1955, p. 285C-287C.

Reviews growth of U. S. industry, raw materials, processing, uses and economics. Tables. 27 ref. (A general, Li)

20-V. **Rhenium.** C. T. Sims, *Metal Industry,* v. 87, Nov. 4, 1955, p. 381-383.

Account of recent research in fabrication, properties and applications. May be used as electrical contacts, electron tube filaments, contacts in marine engine magnetos, whiskers for transistors, and as a wear resistant material. Photograph, table, graphs. 6 ref. (T1, Rh)

21-V. **Tellurium.** J. Lomas. *Mine & Quarry Engineering,* v. 21, Dec. 1955, p. 508-509.

Properties, distribution, production, uses. (Te)

22-V. (Book.) **The Metallurgy of Zirconium.** Benjamin Lustman and Frank Kerze, Jr., editors. National Nuclear Energy Series, Division VII—v. IV. 776 p. 1955. McGraw-Hill Book Co., 330 West 42nd St., New York, N. Y.

Covers extraction, properties, applications, fabrication, and metallography of zirconium and its alloys. Papers individually abstracted. (Zr)

23-V. (Book.) **Tungsten.** K. C. Li and Chung Yu Wang. American Chemical Society Monograph No. 94. 3rd Ed. 506 p. 1955. Reinhold Publishing Corp., 330 W. 42nd St., New York 36, N. Y. $14.00.

Comprehensive up-to-date exposition of the history, geology, ore-dressing, metallurgy, chemistry, analysis, applications, and economics of the metal. (W)

24-V. **New Stainless Steels Containing 17% Cr—4% Ni—6% Mn and 18% Cr—5% Ni—8% Mn.** *American Iron and Steel Institute, Contributions to the Metallurgy of Steel,* no. 47, 1955, 9 p.

Properties, corrosion resistance, fabrication characteristics. Tables, graph. (SS)

25-V. **Rem-Cru C-130AM.** *Rem-Cru Titanium Data Sheet,* 1955, Nov., 12 p.

Design, applications, physical and mechanical properties of 4% aluminum, 4% manganese, 92% titanium alloy. Tables, graphs. 3 ref. (Ti)

26-V. **How to Work Non-Ferrous Metals.** *American Machinist (1956 Pro-*

duction Planbook Issue), v. 99, Mid-Nov. 1955, p. 17-128.

Concise information regarding heat treating, machining, forming, forging, joining and finishing. Tables, diagrams, photograph, graphs. (F general, G general, J general, EG-a)

27-V. Two Special Alloy Steels. *Edgar Allen News,* v. 34, Dec. 1955, p. 270-271.

Two steels, one designed to resist shock and abrasion while being adaptable by heat treatment to a considerable number of parts, the second designed to overcome temper brittleness. Table, graphs. (AY)

28-V. The Properties of Hiduminium 100 (S.A.P.) in Sheet Form. W. M. Doyle. *Sheet Metal Industries,* v. 32, no. 344, Dec. 1955, p. 889-898; disc. p. 902-906, 922.

Manufacturing process and physical property data, such as tensile strength, creep strength, fatigue endurance, physical constants, corrosion resistance and formability. Graphs, tables, diagrams, micrograph, photographs, 8 ref. (Q general, R general, G general, P general, Al)

29-V. Nimonic Alloys and Other Heat-Resistant Materials in Sheet Form. H. E. Lardge. *Sheet Metal Industries,* v. 32, no. 344, Dec. 1955, p. 899-902; disc. p. 902-906, 922.

Some new alloys and applications for alloys formerly used in other forms. Requirements of gas-turbine aircraft engines considered. Tables, photographs. (T24, Ni, SS)

30-V. Properties and Uses of Fortiweld Steel. H. F. Tremlett. *Sheet Metal Industries,* v. 32, no. 344, Dec. 1955, p. 885-888; disc. p. 902-906, 922.

Particular emphasis placed on properties of interest to sheet-metal users. Techniques for working into fabricated sheet-metal components. Tables. (T general, ST)

31-V. (French.) **A New Nickel-Beryllium Alloy With Secondary Emission.** J. Millet. *Vide,* v. 10, nos. 58-59, July-Sept. 1955, p. 96-102.

Method of production, heat treatment, chemical analysis, micrographic and X-ray crystallographic studies. Treatment of alloy for the purpose of forming targets for secondary emission. Tables, graphs, micrographs. 8 ref. (T1, Be, Mg, Ni)

32-V. (German.) **Research Outlines for the Chemistry of Germanium.** Ekkehard Gastinger. *Fortschritte der chemischen Forschung,* v. 3, no. 3, 1955, p. 603-656.

Chemical and physical properties of germanium, its occurrence and geochemistry, production, purification, organic and inorganic compounds, electrochemistry, analytical chemistry, germanium as a component in systems. Tables. 310 ref. (Ge)

33-V. (Polish.) **Rare-Earth Metals in Metallurgy and Casting.** Janusz Czerminski. *Wiadomosci hutnicze,* v. 11, no. 10, Oct. 1955, p. 306-311.

Content of rare-earth metals and some other metals in earth's crust and their use in steelmaking and in castings, and their effect on cast iron and steel structure. Micrographs, tables, photograph, graph. (E general, EG-g, ST, SS, CI)

34-V. (Russian.) **Improvement of Composition of Tool Steels.** Iu. A. Geller. *Metallovedenie i obrabotka metallov,* 1955, no. 3, Sept., p. 1-16.

Comprehensive review of toolsteels for different operations now used in USSR and their improvement through composition and heat treatment. Tables, graphs. 18 ref. (TS)

35-V. (Slovenian.) **The Alloy Al Zn 5.5 Mg2 Cu2 (Cr) and Its Peculiarities.** Viktor Fettich and Anton Urbanc. *Rudarsko-metalurski zbornik,* 1955, no. 3, p. 197-207.

Small amounts of chromium were added to an aluminum alloy, and properties and forming characteristics determined. Best results were obtained by solution-heating at 475° C. for 20 to 30 min., quenching in cold water and age-hardening for 16 to 18 hr. at 120° C. Graphs, tables. 3 ref. (Al)

36-V. Brass and Bronze Alloys. O. R. Scott. *Canadian Metals,* v. 18, Dec. 1955, p. 30-32, 34.

Common brasses and bronzes in use; precautionary measures for producing good commercial castings. Photographs. (E general, Cu)

37-V. Modern Stainless Steels. J. Lomas. *Machinery Lloyd (Overseas Ed.),* v. 27, Dec. 17, 1955, p. 95-98.

Current assessment of the steels with respect to new developments, modifications and discoveries, together with the physical and mechanical properties for different groups. Table. (P general, Q general, SS)

38-V. (Czech.) **Metalworking of Corrosion and Heat Resistant Steels.** Rudolf Pospisil. *Hutnik,* v. 5, no. 10, Oct. 1955, p. 293-298.

Hot and cold working, machining, grinding and polishing, pickling, brazing and oxide cutting are deter-

mined for the various steels according to chemical compositions, mechanical properties, heat treatment. Tables. 6 ref. (F general, G general, L general, K general, SS)

39-V. Nickel in Canada—With a Survey of World Conditions. W. R. McClelland. *Canada, Department of Mines and Technical Surveys, Mines Branch Memorandum Series No.* 130, 1955, 53 p.

History of nickel development, methods employed in mining, milling and metallurgy, world production and resources, principal uses. Maps, diagrams, tables, graphs. 43 ref. (B10, Ni)

40-V. Titanium-Carbide Based Hard Metals for High-Temperature Applications. *Machinery (London),* v. 88, Jan. 6, 1956, p. 29-34.

Four alloys in which proportion of titanium carbide ranges from 75 to 35%. Tensile strength and high-temperature properties. Graphs, photographs, tables. 16 ref. (Ti, EG-d)

41-V. High-Temperature Alloy. *Metal Industry,* v. 87, Dec. 30, 1955, p. 543-546.

Development of a new nickel-base alloy, GMR-235. Its main advantage is its sparing use of strategic materials. Diagrams, micrographs, graphs, table, photograph. (Ni)

42-V. Australian Production of Ductile Chromium. H. L. Wain. *Metal Progress,* v. 69, Jan. 1956, p. 91-96.

Outstanding contributions by Australia in the field of chromium alloy research, with emphasis on the prospects of a ductile high-temperature alloy based on chromium. Diagrams, micrograph, table. (Cr)

43-V. How to Work Titanium and Its Alloys. I. Anderson Ashburn. *Metalworking Production,* v. 100, Jan. 6, 1956, p. 9-17.

Status, properties, heat treating, machining, forming, casting, welding, cleaning and finishing. Tables, graphs. (Ti)

44-V. (Spanish.) **The Quality of Steel.** Albert Portevin. *Instituto del hierro y del acero,* v. 8, no. 39, Oct. 1955, p. 541-568.

Various aspects and criteria of quality, particularly chemical and physical purity, dendritic segregation and structure and factors necessary for obtaining quality steel. Table. 34 ref. (N12, ST)

45-V. (Pamphlet.) **The Titanium Industry.** Walter E. Duncan and Henry G. Fisk. Information Circular No. 7. 38 p. 1955. University of Wyoming, College of Engineering, Natural Resources Research Institute, Laramie.

History, properties, applications, and future demand. (Ti)

46-V. (Book.) **Steels for the User.** R. T. Rolfe. 3rd Rev. Ed. 399 p. 1956. Philosophical Library, Inc., 15 East 40th Street, New York 16, N. Y.

Properties, requirements, compositions, fabrication, testing, applications of carbon and alloy steels. (CN, AY)

46-V. Aluminum Alloys for Elevated Temperature Service. E. H. Dix, Jr. *Canadian Aeronautical Journal,* v. 2, no. 1, Jan. 1956, p. 11-20.

Data on properties and behavior of one new casting alloy, two new wrought alloys and two aluminum powder metallurgy products, as well as a forging alloy not yet used for airframe structures. Above 600° F. the powder metallurgy products showed marked superiority over any of the conventionally produced alloys. Tables, graphs. 2 ref. (T24, Al)

47-V. Modern Stainless Steels. *Edgar Allen News,* v. 35, Jan. 1956, p. 12-13.

Chart showing physical and mechanical properties. (SS)

48-V. The Present Status of Titanium Development. D. J. McPherson. *Journal of Metals,* v. 8, Jan. 1956, p. 23-25; disc. 26-30.

Background of alloy development, heat treatment, new alloys, hydrogen problem, forming, casting, cost, performance competition with other new materials or types of structures, potential applications, and availability. Photograph. (Ti)

49-V. Status of Titanium Fabrication and Use. J. H. Garrett. *Journal of Metals,* v. 8, Jan. 1956, p. 30-32; disc. 32-35.

Uses, economic factors, the role of government and possible applications as an aircraft fastener material. (T24, T7, Ti)

50-V. Design Principles in Magnesium. E. V. Schirmer. *Modern Metals,* v. 11, Jan. 1956, p. 46 + 4 pages.

Design considerations, selection of alloy, fabricating, joining and finishing methods, primers, applications, nonporous castings and high-temperature alloy. Diagrams, graphs, photographs. (Mg)

51-V. The Titanium Outlook. D. J. McPherson. *Modern Metals,* v. 11, Jan. 1956, p. 66, 68, 70, 72.

Properties of eight forging-type alloys and three predominantly sheet alloys, applications, design

factors, and technical and economic outlook. Table, graphs, photograph. 2 ref. (Ti)

52-V. Super-Purity Aluminium and Its Alloys. F. A. Champion and E. E. Spillett. *Sheet Metal Industries,* v. 33, no. 345, Jan. 1956, p. 25-36; disc., p. 36-38.

Preparation, properties and applications of 99.99% pure aluminum which has a very high resistance to corrosion. Diagram, tables, photographs. 17 ref. (Al)

53-V. Research Results for Higher Manganese Stainless Steels. *Steel Processing,* v. 42, Jan. 1956, p. 42.

Composition and properties of stainless steels developed to conserve nickel supplies, using manganese in place of part of the nickel content of regular stainless steel. There are, as yet, no alloys of this type available to take the place of high-temperature stainless types. (SS, Mn, Ni)

54-V. Nickel and High-Nickel Alloys for Pressure Vessels. R. M. Wilson, Jr., and W. F. Burchfield. *Welding Journal,* v. 35, Jan. 1956, p. 32S-40S.

Interpretive report prepared for the Materials Division of the Pressure Vessel Research Committee, summarizing data on analysis, properties, method of determining ASME Code design stresses, embrittlement, cold and hot forming, thermal treatments, cleaning, pickling, welding, joining and inspection. Graphs. 1 ref. (T26, Ni)

55-V. How to Get More for Your Stainless Steel Dollar. I. Purchasing. II. Processing. *Iron Age,* v. 177, Feb. 2, 1956, p. 81-96.

Practical principles to follow in purchasing and processing stainless steels for greatest returns. (SS)

56-V. Wrought Aluminum Alloys. Malcolm W. Riley. *Materials & Methods,* v. 43, Jan. 1956, p. 109-124.

Guide to selection and use of wrought aluminum alloys. Available forms and conditions, engineering properties, forming, joining, finishing. Tables, photograph, diagram. (Al)

57-V. Corrosion Resistance and Mechanical Properties of Cr-Ni-Mn Stainless Steels. R. A. Lula and W. G. Renshaw. *Metal Progress,* v. 69, Feb. 1956, p. 73-77.

The new A.I.S.I. Types 201 and 202 are excellent for many structural applications in corrosive environments. A modified alloy with more chromium and nickel may be necessary to resist the more severe applications in the chemical industry. Graphs, photographs. (SS)

58-V. Zirconium—What Is Its Future? *Nucleonics,* v. 14, Feb. 1956, p. 45-49.

To assess the present status of zirconium as a reactor structural material, a review is presented relating to alloy developments, reduction, fabrication methods and future developments. Tables. 1 ref. (T26, Zr)

59-V. Zinc and Aluminum Die Casting Alloys. I. Donald L. Colwell. *Precision Metal Molding,* v. 14, Feb. 1956, p. 44-46, 78-79.

Mechanical properties of three zinc-base die casting alloys tested after an aging period of 5 years. Graphs, tables, photograph. 17 ref. (Q general, Zn)

60-V. Zirconium. A Bibliography of Unclassified Report Literature. Hugh E. Voress and Thomas W. Scott, compilers. *U. S. Atomic Energy Commission, TID-*3010 (Suppl. 2), 40 p.

228 annotated references covering the period 1953 to 1955; author, subject, and report number indexes included. (Zr)

61-V. New Carburizing Steels for Critical Gearing. II. R. S. Archer, V. A. Crosby and G. A. Timmons. *Iron Age,* v. 177, Feb. 23, 1956, p. 96-100.

Outstanding results have been obtained in an investigation of a series of new carburizing steels with molybdenum as the principal alloying element. Tables, graphs, micrographs. (J28, T7, TS, Mo, Mn)

62-V. Designing for Magnesium. E. V. Schirmer. *Machine Design,* v. 28, Feb. 23, 1956, p. 137-140.

Advantages of use of magnesium over aluminum and steel. Graphs, diagrams, photographs. (Mg, Al)

63-V. (Czech.) **Melting, Effect of Melting and Casting Conditions on the Mechanical Values of Aluminum Bronzes.** Jaromir Nesnidal. *Slévarenstvi,* v. 4, no. 1, Jan. 1956, p. 2-10.

Melting deoxidation and alloying of aluminum bronzes, casting of test specimens and mechanical values obtained from test melts of studied materials. Derives formula for calculation of strength of cast alloys from their chemical composition. Forging, and annealing after forging, of aluminum bronzes. Tables, graphs, diagrams, micrographs. (C21, Q general, F22, J23, Al, Cu)

64-V. (Polish.) **Technology of Wire Production for Thermo-Electric Ele-**

ments. J. Rusz, Z. Misiolek and W. Babinski. *Prace Instytutow Ministerstwa Hutnictwa,* v. 7, nos. 5-6, Dec. 1955, p. 292-301.

Production problems with alloy wire elements. Principles of melting, casting, cold working and heat treatment of these alloys. Tables, graphs. 5 ref.
(F28, T1, SG-q)

65-V. (Book.) **The User Speaks About Magnesium.** Papers individually paged. 1955. Magnesium Association, 122 East 42nd St., New York 17, N. Y.

Twelve papers covering applications, design features, castings, tooling, and magnesium alloys.
(Mg)

66-V. (Book.) **Steels for the User.** R. T. Rolfe. 3rd Rev. Ed. 399 p. 1956. Philosophical Library, Inc., 15 East 40th Street, New York 16, N. Y.

Comprehensive review of properties, requirements, compositions, fabrication, testing, and applications of commercial carbon and alloy steels.
(CN, AY)

67-V. Ultra-High-Strength Steels. K. J. Irvine. *Aircraft Production,* v. 18, Mar. 1956, p. 84-89.

Structures, properties and problems associated with steels in the tensile-strength range of 100 to 150 tons per sq.in. Graphs, table. 12 ref. (T24, ST)

68-V. Zirconium-Fabrication Techniques and Alloy Development. C. E. Lacy and J. H. Keeler. *ASME Transactions,* v. 78, Feb. 1956, p. 427-433.

Fabrication techniques by which zirconium and its alloys are successfully made into various product forms, neutron-absorption characteristics, mechanical properties, and corrosion resistance of zirconium and some zirconium alloys. Diagrams, graphs, photographs, tables. 25 ref. (F general, G general, Zr)

69-V. Composition and Application of Brass Foundry Alloys. Harry St. John. *Foundry,* v. 84, Mar. 1956, p. 110-113.

Compositions, properties and applications of manganese bronze, yellow brass and semired brass alloys. Tables, photographs. (Cu)

70-V. Improving Performance of High-Speed Steel Tools. F. J. Pohlmeyer. *Machinery,* v. 62, Mar. 1956, p. 152-159.

Type of steel, manufacturing process and heat treatment must be carefully controlled to produce high-quality tools. Photographs, table.
(T6, TS)

71-V. Rare Earth Stainless Steels. H. O. Beaver and B. T. Lanphier. *Materials & Methods,* v. 43, Feb. 1956, p. 96-98.

Rare earth additions to stainless steels improve mechanical and hot working properties. Among new alloys are a sulfuric-acid resistant material and a corrosion resistant high-temperature valve steel. Photographs, tables, graph. (Ce, La, SS)

72-V. Titanium Gets Its Second Wind. *Steel,* v. 138, Feb. 27, 1956, p. 69-71.

Increase in output and demand, new uses in aircraft industry and other fields, future of titanium powder metallurgy and of casting. Table, photographs, graph.
(A4, T24, H general, E general, Ti)

73-V. A Guide to Tool Steels & Carbides. *Steel,* v. 138, Mar. 12, 1956, p. 1S-40S.

Companies offering toolsteels, carbides and ceramic cutting tools. Primary applications, trade names, types, chemical analyses. Suggested quenching, media machinability rating, effects of hardening on tolerance. (SG-j, TS, C-n)

74-V. Brass Foundry Alloys. IX. Harry St. John. *Foundry,* v. 84, Apr. 1956, p. 102-105.

Compositions and applications of brass foundry alloys and the high strength of red brasses and bronzes. Photographs, tables. (Q23, Cu)

75-V. The Manufacture and Properties of High-Strength Nickel-Tungsten Alloys. M. Davis, C. E. Densem and J. H. Rendall. *Institute of Metals, Journal,* v. 84, Feb. 1956, p. 160-164.

Desirable qualities of an oxide-coated cathode core metal. It is shown that nickel-tungsten alloys fulfill several of these requirements. Study made of tensile strength, electrical resistivity, thermal conductivity, and of work hardening and annealing behavior. Graphs, tables, phase diagram. 5 ref.
(Q23, P15, P11, J23, Ni, W)

76-V. (Italian.) **Malleable Cast Irons.** P. Bruzzi. *Fonderia,* v. 5, no. 1, Jan. 1956, p. 1-9.

Properties, characteristics, uses. Micrographs, tables, photographs.
(CI)

77-V. Nickel-Free and Low Nickel Austenitic Stainless Steels. D. J. Carney. *American Iron and Steel Institute, Preprint,* 1955, 12 p.

Structural diagrams and properties for Cr-Mn-N steels; comparison with other types of stainless steels; fields of application. Table, graphs, diagram. 1 ref. (SS)

78-V. Investigation of the Soundness of Wrought Zirconium. Verne

Pulsifer. *Armour Research Foundation. (U. S. Atomic Energy Commission),* TID-5184, Oct. 1953, 111 p.

Nondestructive test equipment and methods; bonding of zirconium by hot rolling; metallographic examination of "Zircaloy" tubing. Micrographs, photographs. 110 ref. (S general, M general, Zr)

79-V. Investigation on the Development of Low-Carbon Low-Alloy Steels With Electrolytic Manganese. S. Visvanathan, S. N. Anant Narayan and P. K. Chakravarty. *Tisco,* v. 3, Jan. 1956, p. 19-38.

Possibility of utilizing electrolytic manganese for the production of alloy case-hardening and weldable high-tensile steels. Experimental compositions and properties of forged bars from experimental heats. Graphs, tables. 51 ref. (Mn, AY, CN)

80-V. (Japanese.) Studies on the Boron-Treated Spring Steel TS50B60. I. Yoichi Yasuda and Kichiya Suzuki. *Iron and Steel Institute of Japan, Journal,* v. 42, no. 2, Feb. 1956, p. 105-110.

Inclusions, transformations, heat treatability and grain growth characteristics of boron-treated chromium steel. Comparisons with silicon-manganese, manganese - chromium and chromium-vanadium steels. Tables, graphs, micrographs, diagram. 12 ref. (AY, CN)

81-V. (Japanese.) Influence of Manganese and Carbon on the Properties of W-Cr Nondeforming Tool Steel. I. Naomichi Yamanaka and Kunio Kusaka. *Iron and Steel Institute of Japan, Journal,* v. 42, no. 2, Feb. 1956, p. 111-116.

Measurements of critical point, Jominy hardenability, S-curve for the transformation of austenite, quenched and tempered hardness, retained austenite, dimensional changes, toughness. Table, graphs. 8 ref. (N8, J26, P10, Q23, Q29, TS)

82-V. (Japanese.) Facts About Titanium and Its Alloys. II. Zenichiro Takao and Hidetake Kusamichi. *Iron & Steel Institute of Japan, Journal,* v. 42, no. 2, Feb. 1956, p. 127-138.

Compositions, properties, structure and fabrication procedures. Photograph, tables, graphs, micrographs. 14 ref. (Ti)

83-V. (Russian.) Iron-Copper-Graphite Porous Anti-Friction Alloys. V. E. Mikriukov and N. Z. Pozdniak. *Vestnik Mashinostroeniia,* v. 36, no. 2, Feb. 1956, p. 52-56.

Structure, composition and physico-chemical properties of this alloy. Tables, graphs, micrographs. 4 ref. (SG-c, Fe)

84-V. (Book.) Titanium. v. IV. A. D. McQuillan and M. K. McQuillan. 466 p. 1956. Academic Press, 125 East 23rd Street, New York 10, N. Y.

Basic properties of titanium and its alloys. Ore processing, industrial production, reaction with gases, corrosion and metallographic techniques. (Ti)

85-V. Preparation of Irradiation Specimens of the Uranium-Chromium Eutectic Alloy. H. A. Saller, R. F. Dickerson and W. E. Murr. *Battelle Memorial Institute, (U. S. Atomic Energy Commission),* BMI-945, Aug. 1954, 19 p.

Casting methods and fabrication techniques used for the production of reactor specimens. Tables, photographs, diagrams. (T25, Cr, U)

86-V. The New Stainless Steels. D. B. Roach and A. M. Hall. *Materials & Methods,* v. 43, Apr. 1956, p. 137-152.

Mechanical engineering data for new steels that save on strategically scarce materials or provide special properties. Properties and applications are considered for the high-manganese, extra-low-carbon and the precipitation-hardenable grades, and ferritic steels for elevated temperature service. Photographs, tables. (SS)

87-V. The Rare Earths Up From Obscurity. R. C. Vickery. *Research & Engineering,* v. 2, Apr. 1956, p. 28-33.

The development of rare-earth chemistry, separation techniques, properties, present and future applications. Graphs, photograph, table. (EG-g)

88-V. (German.) Production and Hardening of Iron-Cobalt-Zinc Alloys. Werner Köster and Heinz Schmid. *Archiv für das Eisenhüttenwesen,* v. 27, no. 3, Mar. 1956, p. 211-217.

Microscopic and magnetic investigation for production of the three-element system; determination of smelting equilibria and reaction processes. Characterization of phase changes in solid state by means of sections at 500, 650 and 800° C. Hardness investigation, coercive force measurements. Graphs, diagram, phase diagrams, micrographs. 11 ref. (D general, J general, M21, P16, Fe, Co, Zn)

89-V. Brass Foundry Alloys. Harry St. John. *Foundry,* v. 84, May, 1956, p. 157-159.

Compositions and applications of aluminum bronzes and copper-nickel alloys. Photographs, tables. (T general, E general, Cu)

90-V. Cast Manganese Steel. E. Piwowarsky and H. L. Roes. *Foundry Trade Journal,* v. 100, Apr. 5, 1956, p. 141-149.

Production and metallurgy, including general properties; effect of individual elements, wall thickness, casting temperature; as cast structure; determination of castability and heat treatment. Graphs, photographs, micrographs, tables. 15 ref. (To be continued.) (CI)

91-V. Rem-Cru A-40, A-55 and A-70. *Rem-Cru Titanium Data Sheet,* Feb. 1956, 16 p.

Grades, applications, forms available, physical and mechanical properties, shear, emissivity, creep, fatigue, machinability, corrosion resistance. Tables, graphs. (Ti)

92-V. Beryllium and Zirconium. G. L. Miller. *Times Review of Industry,* v. 10, new ser., Apr. 1956, p. 24-25, 27-28.

Sources, production, fabrication, atomic energy applications, and economic aspects. Tables. 9 ref. (Be, Zr)

93-V. Carbides. V. M. Sheipline and R. J. Runck. Paper from "High-Temperature Technology". John Wiley & Sons. p. 114-130.

Preparation, structure and properties of alkaline-earth metal carbides, carbides of boron and silicon, aluminum and the rare-earth metal carbides, and transition or "hard-metal" carbides. Tables. 122 ref. (SG-h, C-n)

94-V. Borides. C. F. Powell. Paper from "High-Temperature Technology". John Wiley & Sons. p. 131-150.

Preparation and properties of refractory-metal borides. Tables. 61 ref. (SG-h, EG-d)

95-V. Silicides. Ralph Wehrmann. Paper from "High-Temperature Technology". John Wiley & Sons. p. 151-170.

Preparation, properties and applications; metal-silicon systems. Table. 125 ref. (SG-h, Si)

96-V. Nitrides. John M. Blocher, Jr. Paper from "High-Temperature Technology". John Wiley & Sons. p. 171-186.

Preparation and properties of stable, high-melting nitrides. Tables. 41 ref. (SG-h)

97-V. Chromium-Nickel Alloys for High-Temperature Applications. Albert G. Bucklin and Nicholas J. Grant. Paper from "Symposium on Metallic Materials for Service at Temperatures Above 1600° F." American Society for Testing Materials, p. 47-56; disc., p. 56.

Alloys containing 35 to 70% chromium with additions of iron, molybdenum, and columbium, were precision cast and tested in stress-rupture at 1600 to 1800° F. Micrographs, graphs, tables. 5 ref. (Ni)

98-V. (French.) **Ultra-Light Results Obtained in Foundry Alloys Intended for Aeronautical Construction.** Raoul Pradeau. *Métaux, Corrosion-Industries,* v. 31, no. 367, Mar. 1956, p. 140-147.

Investigates problem of making cast magnesium alloy pieces lighter. Development of ultra-light foundry alloys since 1946. Characteristics of magnesium-zirconium foundry alloys. Tables, graphs. 5 ref. (T24, Mg, Zr)

99-V. (French.) **A New Foundry Alloy A-Z5G.** Charles Roinet. *Revue de l'Aluminium,* v. 33, no. 229, Feb. 1956, p. 153-161.

Properties, composition and structure of aluminum-zinc alloy. With only aging or normalization at 180° C., it offers good mechanical, static and dynamic properties and also a remarkable shock resistance. It is easily machined, can be welded, brazed, polished and anodized. Graphs, tables, photographs. (Al)

100-V. New Aluminum Casting Alloy XA140 for Elevated Temperature Applications. R. C. Lemon and W. E. Sicha. *American Foundrymen's Society, Preprint No.* 56-61, 1956, 3 p.

New alloy contains 8% Cu, 6% Mg, and 0.5% each of Mn and Ni. At temperatures of 400 to 600° F., the tensile and fatigue strengths are superior to those of other commercial aluminum casting alloys, and its resistance to loss of high-temperature strength upon prolonged heating is outstanding. Graphs. 3 ref. (Q23, Q7, Al)

101-V. New Aluminum Permanent Mold Casting Alloys C355 and A356. R. C. Lemon and H. Y. Hunsicker. *American Foundrymen's Society, Preprint No.* 56-62, 1956, 5 p.

Two new aluminum alloys that provide high levels of strength and ductility for permanent mold castings. Designated C355 and A356, these higher purity variations of alloys 355 and 356 offer the design engineer a wide range of mechanical properties. Graphs, photographs, tables. 3 ref. (E12, Q23, Al)

102-V. An Evaluation of ZH62XA Magnesium Sand Casting Alloy. K. E.

Nelson and W. P. Saunders. *American Foundrymen's Society, Preprint No.* 56-64, 1956, 9 p.

Combines a reasonable degree of castability with excellent tensile properties at room temperature. Its creep resistance at moderately elevated temperatures appears to be improved over alloy ZK51A. It can be welded by argon-arc or heli-arc methods and no special procedures are required to apply surface protecting treatments. Graphs, photographs, tables. 18 ref.
(E general, Q23, K1, Mg)

103-V. Malleable Base Spheroidal Iron. F. B. Rote, E. F. Chojnowski and J. T. Bryce. *American Foundrymen's Society, Preprint No.* 56-81, 1956, 10 p.

A new high-strength alloy having graphite in a spheroidal form in a highly stable matrix. The metal is heat treated by conventional anneal, quench and draw processes. Graphs, micrographs, photographs, tables. (CI)

104-V. "Gmoodie"—A Low-Cost Die Material. J. C. Holzwarth and A. L. Boegehold. *Metal Progress,* v. 69, May 1956, p. 49-53.

Forming dies made from a new zinc-base alloy will last three to four times as long as dies made from conventional zinc alloys. Greater life is due to a dispersion of hard Ni_3Ti particles in the matrix that increases wear resistance. Graphs, micrograph, photographs, table.
(SG-j, Zn)

105-V. Manganese-Copper High-Damping Alloys. J. W. Jensen and J. A. Rowland, Jr. *Product Engineering,* v. 27, May 1956, p. 135-137.

Mechanical properties, fabrication characteristics, potential applications of alloys having the unusual combination of high tensile strength and high damping capacity. Diagrams, graphs, table. (Cu)

106-V. Thermenol, Non-Strategic Aluminum-Iron Base Alloy for High-Temperature Service. J. F. Nachman and W. J. Buehler. *U. S. Naval Ordnance Laboratory, Navord Report* 3700, June 1954, 14 p.

Details of the melting, casting and hot and cold rolling techniques used in producing the thermenol-type alloys (aluminum-iron with ternary additions) in sheet form, with particular emphasis on the importance of obtaining a fine equi-axed grain size in the cast slab. Diagrams, photographs, tables. (SG-h, Al, Fe)

107-V. Status of Beryllium Technology in the U.S.A. A. R. Kaufmann and B. R. F. Kjellgren. Paper from "Proceedings of the International Conference on the Peaceful Uses of Atomic Energy. v. VIII. Production Technology of the Materials Used for Nuclear Energy". United Nations. p. 590-599.

Production, fabrication, metallurgy, properties, corrosion, health hazards and predictions for the future. Table. 20 ref. (Be)

108-V. High-Strength Steel 4340. John Dietz and L. H. McCreery. *Aero Digest,* v. 72, May 1956, p. 48, 50, 52.

Rigid requirements for a lightweight airframe alloy in the 400° F. tempering ranges are met through special processing and plating of the above. Tables. (T24, AY)

109-V. Molybdenum in Low and Medium Alloy Steel Castings. W. J. Jackson. *Alloy Metals Review,* v. 8, Mar. 1956, p. 2-8.

Effect of molybdenum on properties and uses of the castings. Photographs, tables, graph, 26 ref.
(CI, Mo)

110-V. Latest Developments in Spheroidal-Graphite Iron. W. W. Braidwood. *Foundry Trade Journal,* v. 100, May 17, 1956, p. 321-330.

Use of metallic magnesium for inoculation, use of nickel-free magnesium, foundry equipment, mechanical properties, heat treatment and applications of nodular iron. Photographs, diagrams, micrographs 12 ref. (CI)

111-V. New Applications, New Compositions, and New Production Methods Highlight the Expanded Use of Light Alloys—Aluminum, Magnesium and Titanium. P. D. Frost. *Machine Design,* v. 28, May 31, 1956, p. 86-89.

Fabrication, properties and applications. New developments in alloy composition, heat treatment and stability. Compares light alloys with other materials, such as stainless steels. Photographs, graphs, diagrams, tables. (EG-a)

112-V. Copper and Copper Alloys. A Survey of Technical Progress During 1955. E. Voce. *Metallurgia,* v. 53, no. 318, Apr. 1956, p. 143-152.

Finishing and plating, properties and applications, corrosion, joining, powder metallurgy, physical metallurgy, analysis and testing. 199 ref. (Cu)

113-V. Molybdenum. C. L. Miller. *Times Review of Industry,* v. 11, new ser., May 1956, p. 28, 31.

Sources, production statistics, fabrication, prices and uses. Graphs, tables, 7 ref. (Mo)

114-V. Some Aspects of Aluminum Research in India. E. G. Ramachandran. Paper from "Directory of Aluminium." The Electrochemical Society, p. 26-29.

Present status of research along the lines of production methods, structure and properties, electrical conductors, protective coatings, bearings, high-temperature alloys and coinage. 11 ref. (Al)

115-V. The Properties of Thorium Alloys. Murray C. Udy. and Francis W. Boulger. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* BMI-89, Sept. 1951, 93 p.

Structure and properties of 39 thorium alloy systems. Diagram, tables, graphs. 76 ref. (Th)

116-V. New Alloys for Automotive Turbines. Donald N. Frey. *Foundry,* v. 84, June 1956, p. 108-111.

Costs, properties, structure and fabricating qualities of ferritic and austenitic alloys. Tables, graphs. 2 ref. (T25, SG-h)

117-V. The Fabrication and Properties of 16-Alfenol—a Non-Strategic Aluminum-Iron Alloy. J. F. Nachman and W. J. Buehler. *U. S. Naval Ordnance Laboratory, Navord Report* 2819, Apr. 1953, 28 pages.

Methods of fabrication from cast slab to thin-gage tape. Structure and magnetic properties. Diagram, micrographs, tables, graphs, photographs. 6 ref. (P16, Al, Fe)

118-V. (Czech.) **Aluminum Bronzes: Their Properties and Uses.** Bedrich Puchnar. *Hutnik,* v. 5, no. 12, Dec. 1955, p. 362-366.

Effect of nickel, maganese, iron and other additions on mechanical properties. Properties of finished products, weldability, castability, forgeability and corrosion reistance. Tables, graphs, diagrams. 2 ref. (Cu)

119-V. (French.) **Technical Guide for the Purchaser of Special Steels. III.** G. Grenier. *Journal du Four Electrique,* v. 65, no. 2, Mar.-Apr. 1956, p. 63-65.

Structures of special steels, variations depending on carbon content, heat treatment, and amount and nature of additions. (To be continued.) Graphs, table. (AY)

120-V. (French.) **Rare Earth Metals.** Félix Trombe. *Revue de Métallurgie,* v. 53, no. 1, Jan. 1956, p. 1-36.

Preparation, properties, alloys and applications. Graphs, diagrams, tables. 177 ref. (EG-g)

121-V. (Book.) **Directory of Aluminium.** N. R. Srinivasan, editor. 65 p. 1955. The India Section, The Electrochemical Society, Inc. Indian Institute of Science, Bangalore-3, India.

Articles on resources, research and uses of aluminum in India, tables of properties, specifications, standards and patents; directory of producers, manufacturers, and scientific and technical societies. (Al)

122-V. (Book-English.) **Magnesium Fabricating and Casting.** 83 p. 1956. The European Productivity Agency of The Organisation for European Economic Co-Operation, 2, Rue André-Pascal, Paris 16, France.

Melting, sand casting and die-casting, pressure die-casting, extrusion and rolling, forming and welding, inspection and research. (Mg)

123-V. Properties of Zircaloy—2. D. E. Thomas and F. Forscher. *Journal of Metals,* v. 8, May 1956, p. 640-645.

A recent zirconium alloy with improved corrosion resistance and strength for atomic reactor construction. Photograph, micrographs, tables, graphs. 15 ref. (T25, Zr)

124-V. Experience With High-Manganese Stainless Steels. Richard E. Paret. *Metal Progress,* v. 69, June 1956, p. 68-71.

Newly standardized Types 201 and 202 should save much nickel, for they match most of the properties of 18-8 in sheet form. Changes in tooling are seldom necessary in the usual fabrication operations. Graph, tables, photographs. (SS)

125-V. Impurities in Titanium: Phosphorus. D. A. Sutcliffe. *Great Britain, Royal Aircraft Establishment Technical Note* MET.227, Sept. 1955, 10 p. + 1 plate.

Effect of phosphorus on properties of titanium. (Ti)

126-V. High-Flying Ti. S. R. Carpenter. *Western Machinery and Steel World,* v. 47, June 1956, p. 68-73.

The strength-weight properties of titanium, heat treat considerations, fatigue characteristics and some shop forming methods with reference to aircraft.
(Q23, Q7, G general, T24, J general, Ti)

127-V. Investigation of the Effects of Hot-Cold Work on the Properties of Molybdenum Alloys. *Climax Molyb-*

denum Company, Progress Report for Wright Air Development Center Contract No. AF 33(616)-2861, July to Sept. 1955, 18 p.

Interdependence of the degree of strain hardening, recrystallization temperature and mechanical properties of the Mo-0.3% Nb and Mo-0.5% Ti alloys. (Q general, Ti, Nb, Mo)

128-V. Investigation of Manufacturing Techniques for Titanium Alloy Sheet Material. *Ryan Aeronautical Company, Fourth and Fifth Progress Reports Nos. G-17-87 and G-17-88.* Contract No. AF 33(600)-31606, Apr. and May 1956, 39 and 35 p.

Reports on fusion welding testing resistance welding, heat treatment, tensile tests, embrittlement and scaling tests, and notch sensitivity tests. (K1, K3, J general, Q23, Ti)

129-V. Ti-22. Metal of the Future. M. G. Dobrolyubskaya. *Bureau for Translations, Canada. Translation No.* 15. 4 p. Directorate of Scientific Intelligence Defence Research Board, Ottawa, Canada. (From *Nauka i Zhizu'*. no. 11, 1955, p. 17-19).

Report on titanium industry and properties. (Ti)

130-V. (Czech.) **Antiremanent Fe-Si-Al Alloy "Sendust".** L. Duben. *Strojirenstvi,* v. 6, no. 2, Feb. 1956, p. 110-112.

Magnetic properties, including antiremanence. Method of casting, chemical compositon, heat treatment, uses in industry. Disadvantages include brittleness. (P16, E general, Q23, J general, T general, Si, Fe, Al)

131-V. (Czech.) **Properties and Treatment of Thermostat Bimetals.** J. Tykva. *Strojirenstvi,* v. 6, no. 2, Feb. 1956, p. 121-124.

Methods of determining physical and mechanical properties. Extreme delicacy of metals requires care in welding, machining and heat treatment. Effect of nickel content on coefficient of thermal expansion. (SG-a, Cu, Ni, Fe)

132-V. (German.) **Boron in Heat Treatable and Case-Hardening Steels.** F. Erdmann-Jesnitzer and H. Kahle. *Neue Hütte,* v. 1, no. 6, May 1956, p. 322-332.

Influence of boron upon hardenability, properties of boron steels, metallurgical characteristics, theories of the boron effect. (Q29, B. ST)

133-V. (German.) **The New High Capacity Hard Metal Quality S6HL.** C. Agte. *Neue Hütte,* v. 1, no. 6, May 1956, p. 333-338.

Composition, production and properties; cutting behavior and fields of application. (EG-d)

134-V. A Study of Ti-Al Alloys. II. The Effects of Addition of Ni on the Properties of Ti-Al Alloys. Susumu Yoshida and Takashi Araki. *Journal of Mechanical Laboratory (Japan),* v. 1, 1955, p. 35-36.

Effect of nickel on fabrication, hardness, strength and transformation temperature. (F general, G general, Q29, Ni, Al, Ti)

135-V. Some Aspects of Hardenable Alloy Steels. Herbert J. French. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, June 1956, p. 770-782.

Chemical composition significantly affects ductility and notch toughness of tempered martensites. Data suggest that mechanical properties of triple alloy nickel-chromium-molybdenum steels are superior to those of double or single alloy steels. (Q general, AY)

136-V. Making 200-Type Stainless. G. W. Hinkle. *Steel,* v. 139, July 9, 1956, p. 94, 96.

Production characteristics and corrosion properties of the new low-nickel stainless grades. (SS, Ni)

137-V. (French.) **The Preparation of High-Purity Iron Monocrystals and Certain Properties of This Metal.** J. Talbot. *Institut de Recherches de la Siderugie, Publications,* ser. A, no. 137, Apr. 1956, 50 p.

Study of the preparation, analysis and polygonization of pure iron; mechanical properties. (Q general, Fe)

138-V. (Pamphlet.) **Literature Survey on the Production, Properties, and Uses of Zirconium.** F. J. Shortsleeve and R. L. Folkman. 31 p. 1953. Union Carbide and Carbon Research Laboratories, Niagara Falls, N. Y.

Extraction and production of metallic zirconium; properties of and potential use for zirconium and zirconium-base alloys; zirconium as a minor alloy addition. (V, Zr)

139-V. (Book.) **Zirconium—Technology and Economics.** Calvin Davis, Editor. 113 p. 1956. Atomic Industrial Forum, Inc., 260 Madison Avenue, New York 16, N. Y. $3.00.

A committee report on production, fabrication, properties, alloys, supply, commercial products and future requirements. (Zr)

140-V. (Book.) **Handbook of Welded Tubing.** 267 p. 1956. Formed Steel Tube Institute, Inc., 850-852 Hanna Bldg., Cleveland 15, Ohio. $20.00.

Advantages of tubing, types of tubing, mechanical properties and specifications, fabrication, typical applications, design data. (SS, CN)

141-V. Titanium Today. *American Machinist,* v. 100, July 16, 1956, p. 129-144.

Data on costs, consumption, supply and recent developments; bibliography of recent articles; a color-illustrated case study on fabricating titanium sheet; experience with arc welding titanium alloys in open air. (Ti)

142-V. Mechanical Steel Tubing for Parts Fabrication. *Materials & Methods,* v. 44, July 1956, p. 100-102.

Cut-off tube sections can be machined, forged or cold formed to produce many parts at lower cost than possible with solid bar stock. (G general, ST)

143-V. (Polish.) **Beryllium Copper.** Kazimierz Kurski. *Wiadomosci Hutnicze,* v. 12, no. 6, 1956, p. 173-177.

General discussion of copper-beryllium alloys; properties and uses of alloys containing 1.7% and 2.0% beryllium; effects of different periods of age hardening and of nickel and cobalt additions; hot and cold forming. (Be, Cu)

144-V. (Polish.) **Titanium—Metal of the Future.** Ludwik Gielicz. *Wiadomosci Hutnicze,* v. 12, no. 6, 1956, p. 181-184.

Comparison of properties of aluminum, iron and titanium. Titanium is widely used for welding electrode coating, but metal was not produced on commercial scale until 1948. Discussion of titanium ores. Possibility of obtaining titanium from blast furnace by-products. (Ti)

145-V. (Spanish.) **Theory and Practice of High-Speed Steels Containing Aluminum. Recent Investigations With High-Carbon Steels Containing Nitrogen.** Roland Mitsche. *Instituto del Hierro y del Acero,* v. 9, no. 45, Apr. 1956, p. 375-385.

Effect of aluminum additions on fabrication, structure and properties. (TS, Al)

146-V. Lithium. L. Sanderson. *Canadian Mining Journal,* v. 77, July 1956, p. 70-71, 76.

Extraction methods, properties, uses and alloys, sources. (Li)

147-V. Fabrication of Titanium. *Metal Industry,* v. 89, July 6, 1956, p. 11-12.

Stretch forming, use of drop hammers, welding, mechanical properties influencing springback. (G9, G3, K general, Q general, Ti)

148-V. Constant Modulus Alloy for Elastic Elements. Marshall Ward. *Product Engineering,* v. 27, July 1956, p. 135-140.

"Ni-Span C", a hardenable, high strength and heat-resistant nickel-chromium alloy, maintains constant elastic modulus over −50 to 150° F. Physical and mechanical properties and design stresses; heat treating time and temperature; machining, cleaning and joining procedures. (P general, Q general, J general, G17, Ni, Cr)

149-V. How to Use the New Low Nickel, Austenitic Stainless Steels. *Steel Processing,* v. 42, July 1956, p. 404-406.

Properties, corrosion resistance, fabrication, welding characteristics and chemical compositions. (SS)

150-V. Tool and Die Steels for Hot Working Operations. E. Johnson. *Alloy Metals Review,* v. 8, June 1956, p. 2-9.

The main characteristics, properties and uses of some typical hot work steels. (TS)

151-V. Department of Defense Titanium Sheet-Rolling Program. W. J. Harris, Jr. *Battelle Memorial Institute, Titanium Metallurgical Laboratory Report No.* 46, June 1956, 22 p.

Outline of the participants in and objectives of the sheet-rolling program includes target properties for alloys, properties of candidate alloys and some suggested testing procedures. (F23, Ti)

152-V. Stainless Steel Castings. F. R. H. Allon. *Canadian Metals,* v. 19, July 1956, p. 38.

Varieties of stainless steel and their characteristics. (SS)

153-V. Zirconium: Problems and Trends. W. E. Kuhn. *Canadian Metals,* v. 19, July 1956, p. 40, 42.

Corrosion resistance, applications in atomic reactors and in the chemical industry. (Zr)

154-V. The Platinum Metals. *South African Mining and Engineering Journal,* v. 67, pt. 1, June 1956, p. 1035 + 5 pages.

World resources, current metallurgical practices and the uses of this important group of metals. (A4, Pt)

155-V. (French.) **Producing a Complex Copper Alloy: U-E3-S.** *Fonderie*, no. 125, June 1956, p. 238-241.

Alloy used in aircraft construction has a hardness of 85 to 100 Brinell units. Production is a very delicate operation. (Cu)

156-V. (German.) **Literature Review.** *Aluminium - Industrie - Aktien - Gesellschaft, Forschungsinstitut*, no. 13, July 1956, p. 156-170.

Review of literature on aluminum and its alloys, applications in industry and construction and properties. (T general, Al)

157-V. (Book.) **Chromium. v. I. Chemistry of Chromium and Its Compounds.** Marvin J. Udy. Monograph Series No. 132. 433 p. 1956. Reinhold Publishing Corp., 430 Park Ave., New York, N. Y. $11.00.

History of chromium; mineralogy and geology; chemical and physical properties; analytical chemistry; manufacture and use of chromium and its compounds. (Cr)

158-V. (Book.) **Sodium, Its Manufacture, Properties and Uses.** Marshall Sittig. Monograph Series No. 133. 529 p. 1956. Reinhold Publishing Corp., 430 Park Ave., New York, N. Y. $12.50.

Includes analysis and thermodynamics of sodium. (S11, P12, Na)

159-V. Hardenable Silver Alloy. Winthrop Warren. *Materials & Methods*, v. 44, Aug. 1956, p. 106-107.

Irreversible hardening of silver-magnesium-nickel alloy provides high hardness and low creep rate at elevated temperatures. Properties favor electronic and electrical applications. (Ag)

160-V. Tool Life Increased With New Steel. J. Y. Riedel. *Metal Progress*, v. 70, Aug. 1956, p. 69-71.

A new chromium-molybdenum toolsteel has been developed with improved shock resistance and service life in both hot and cold work applications. (TS)

161-V. Zirconium, Its Production and Properties. *U. S. Bureau of Mines Bulletin* 561, 1956, 180 p.

Ores, reduction processes, melting, fabrication, alloys, uses, availability, analytical procedures. (Zr)

162-V. (English.) **The Effect of Nb, V, Ti and N_2 on the Properties of Ni-Cr (20-15%) System and Ni-Cr-Co (20-15-15%) System Heat Resisting Steel for Gas Turbines.** Sadao Koshiba and Tsuneo Kuno. *Hitachi Review*, no. 13, May 1956, p. 19-25, 18.

Tests involved forgeability, aging hardness, microstructure, mechanical properties at high temperatures, resistance to oxidation, and creep limit. (F22, N7, M27, Q general, R2, Cb, V, Ti, SS-h)

163-V. Study of the Effect of Gases on the Melting, Casting, and Working of Palladium. R. H. Atkinson. *Journal of Metals*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, sec. 2, Aug. 1956, p. 1029-1035.

Experimental procedure; observations on density and hardness, reducing gases as deoxidizers. (Pd)

164-V. Experimental Magnesium Alloys Containing Nickel, Manganese, Lithium, and Aluminum. J. A. Rowland, C. E. Armantrout and D. F. Walsh. *U. S. Bureau of Mines, Report of Investigations* 5250, July 1956, 21 p.

The magnesium-nickel and magnesium-nickel-manganese alloys failed to develop superior mechanical properties and were very low in resistance to corrosion. Magnesium-lithium alloys offer possibilities warranting further investigation. (Mg)

165-V. (Italian.) **Principal Alloying Elements Added to Cast Iron and Steel; Their Influence and Use.** *Fonderia*, v. 5, no. 5, May 1956, p. 254-255, 257, 259; no. 6, June 1956, p. 303 + 4 pages.

Effects of lead, copper, columbium and oxygen. (To be continued.) (CI)

166-V. (Russian.) **Cast Carbon Steel With Boron Added.** Ia. E. Goldshtein, L. L. Piatakova and O. D. Zhizhakina. *Vestnik Mashinostroenia*, v. 36, no. 7, July 1956, p. 23-27.

Small quantities of boron added to low-carbon, medium-carbon, chromium, chromium-manganese and chromium-nickel steels improve the tempering properties, and reduce the quantities of alloy elements needed, especially nickel, molybdenum, chromium and manganese. (AY)

167-V. Manufacture and Availability of the Alkali Metals. Marshall Sittig. *Chemical Engineering Progress*, v. 52, Aug. 1956, p. 337-341.

Manufacturing processes and brief comparison of thermochemical and electrolytic methods. Predicts increased production of sodium and lithium. (EG-e)

168-V. Fundamentals of Stainless Steel. G. E. Rowan. *Pulp and Paper Magazine of Canada*, v. 57, Aug. 1956, p. 128-132.

General information on bars, forgings, wire, strip, sheet and plate, tubing and stainless products. (SS)

169-V. An Austenitic Alloy for High-Temperature Use. R. W. Guard and T. A. Prater. *American Society for Metals, Transactions,* v. 49, *Preprint No.* 32, 1956, 18 p.

Processing data on a high-cobalt austenitic alloy, J1570, having a 1600° F., 1000-hr. rupture strength of 15,500 psi. Physical and mechanical properties. (Co, SG-h)

170-V. (French.) **Titanium.** J. Cueilleron. *Chimie & Industrie,* v. 76, no. 1, July 1956, p. 63-71.

History, metallurgy, mechanical and chemical properties of metallic titanium and its alloys. Use in France. Replacement of 18-8 steel. The way is open to improvement in production methods and to systematic study of alloys. (Ti)

171-V. (Hungarian.) **Heat-Resistant Economical Alloys.** *Ontöde,* v. 11, no. 7, July 1956, p. 161-166.

Summarization of Czechoslovak research on heat resistant ferrous aluminum alloys. Data on the composition and properties of alloys and castings. Evaluation of laboratory work. (SG-h, Fe, Al)

172-V. (Swedish.) **Beryllium.** Sigge Hähnel. *Teknisk Ukeblad,* v. 103, no. 31, Aug. 30, 1956, p. 716-719.

Sources of ore, production methods, characteristics and mechanical properties, alloys, application to atomic reactors. (Be)

173-V. The Preparation and Properties of High-Purity Iron. B. E. Hopkins. *Metallurgical Reviews,* v. 1, pt. 1, 1956, p. 117-155 + 1 plate.

Chemical, electrochemical and metallurgical production processes; physical and mechanical properties. (Fe)

174-V. Niobium. F. G. Cox. *Welding and Metal Fabrication,* v. 24, Oct. 1956, p. 352-358.

Properties, corrosion resistance, general working characteristics, machining and welding discussed with reference to use in reactors. (Cb)

175-V. High Temperature Materials —A Review. Eric A. Brandes. *Product Engineering,* v. 27, Sept. 1956, p. 186-190.

Early development, properties needed, methods of evaluation; materials now available. (SG-h)

176-V. Special Steels and Alloys. G. T. Harris. *Research,* v. 9, Sept. 1956, p. 335-346.

Compositions, properties and uses of various types of steel and other alloys. (SG-h, ST, Ti)

177-V. Properties of Titanium. R. L. Preece. *Sheet Metal Industries,* v. 33, no. 353, Sept. 1956, p. 633-635, 646.

Corrosion and frictional characteristics, cost, methods of melting, welding applications, brazing and soldering. (Ti)

178-V. Guide to Hot Work Tooling. H. E. Replogle. *Steel,* v. 139, Sept. 24, 1956, p. 116-119.

Charted data on compositions, heat treatments and hardnesses of toolsteels developed for hot forging, forming, extruding and molding dies. (TS)

179-V. (German.) **Nodular Cast Iron.** H. Mühlberger. *VDI Zeitschrift,* v. 98, no. 24, Aug. 1956, p. 1449-1461.

Production, physical and mechanical properties, heat treatment, surface hardening and treatment, workability; applications. (CI)

180-V. (Polish.) **Technology and Application of Cadmium.** Jan Drozdz. *Wiadomosci Hutnicze,* v. 12, July-Aug. 1956, p. 223-229.

Properties and applications, raw materials and methods of extraction. (Cd)

181-V. (Russian.) **Properties and Application of Low-Alloy Steel.** I. M. Leikin. *Metallurg,* no. 8, Aug. 1956, p. 1-4.

Chemical composition, mechanical properties and applications of Soviet and Western European low-alloy and carbon steels. (ST)

182-V. (Swedish.) **Modern Cast Iron. A Survey.** *Gjuteriet,* v. 46, no. 8, Aug. 1956, p. 106-110.

Classifying cast irons according to their types: gray, annealed and hard. Description of each and comparison with cast steel. Uses of each type. (CI)

183-V. Aluminum 1100. Commercially Pure Aluminum. *Alloy Digest,* no. Al-44, Oct. 1956.

Composition, physical constants, mechanical properties, heat treatment, machinability, weldability, corrosion resistance and workability. (Al)

184-V. Chase 444 Bronze. Free-Cutting Phosphor Bronze. *Alloy Digest,* no. Cu-43, Oct. 1956.

Composition, physical constants, mechanical properties, heat treatment, machinability, workability and corrosion resistance. (Cu)

185-V. Apex 910. Magnesium Die Casting Alloy. *Alloy Digest,* no. Mg-28, Oct. 1956.

Composition, physical constants, mechanical properties, heat treatment, castability and corrosion resistance. (Mg, Al)

186-V. Udimet 500. Heat Resistant Alloy. *Alloy Digest,* no. Ni-28, Oct. 1956.

Composition, mechanical properties, heat treatment, machinability, weldability and corrosion and heat resistance. (SG-h)

187-V. Nitralloy 225 Nitriding Steel. *Alloy Digest,* no. SA-48, Oct. 1956.

Composition, physical constants, mechanical properties, machinability, weldability and corrosion resistance. (AY)

188-V. AISI 8630. Triple Alloy Steel. *Alloy Digest,* no. SA-49, Oct. 1956.

Composition, physical constants, mechanical properties, heat treatment, machinability and weldability. (AY)

189-V. Allegheny Ludlum 316 & 316L Acid Resistant Steels. *Alloy Digest,* no. SS-48, Oct. 1956.

Composition, physical constants, mechanical properties, heat treatment, machinability, weldability and corrosion resistance. (SS)

190-V. Halcomb 218 Hot Work Steel, Type H-11. *Alloy Digest,* no. TS-51, Oct. 1956.

Composition, physical constants, mechanical properties, heat treatment, machinability and workability. (TS)

191-V. Lead and Its Alloys. Kempton H. Roll. *Industrial and Engineering Chemistry,* v. 48, pt. 2, Sept. 1956, p. 1731-1734.

Recent progress in application of lead in engineering; research, development and corrosion studies with lead. (Pb)

192-V. Nickel, Including High-Nickel Alloys. R. M. Fuller. *Industrial and Engineering Chemistry,* v. 48, pt. 2, Sept. 1956, p. 1742-1759.

Reviews mining and production, metallurgical research and development, production, welding and fabrication, high-temperature applications, plating and applications of nickel and high-nickel alloys. (Ni)

193-V. Stainless Steels, Including Other Ferrous Alloys. Walter A. Luce. *Industrial and Engineering Chemistry,* v. 48, pt. 2, Sept. 1956, p. 1775-1787.

Reviews corrosion and high-temperature resistance, mechanical properties and structure, welding and general applications of stainless steels. (SS)

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Production, fabrication, oxidation and corrosion and physical metallurgy progress for 1955. (Ti)

196-V. Materials Engineering File Facts. Nodular or Ductile Irons. *Materials & Methods,* v. 44, Sept. 1956, p. 143, 145.

Composition, physical and mechanical properties, thermal treatment, fabricating properties and uses of six types. (CI)

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High reflectivity and superior tarnish resistance make it ideal for reflectors, jewelry, tableware and decorative trim. It also takes a fine anodized finish; can be strengthened by alloying.
(T general, Al)

198-V. Hot-Work Tool Steels: Applications, Compositions, Heat Treatment. *Tool Engineer,* v. 37, Oct. 1956, p. 119-122.

Recommended compositions, heat treatments and hardnesses for dies used in the hot forging, forming and extrusion of ferrous metals. Data on hot work steels for aluminum, magnesium and zinc die-casting dies. Die compositions for pressure casting of brass. (T5, TS)

199-V. Preliminary Report on Status and Evaluation of Carbon Steel. Hugh F. Beeghly. *Westinghouse Electric Corporation, Atomic Power Division (U. S. Atomic Energy Commission),* WAPD-CP-622, 40 p.

Corrosion data, chemical and mechanical properties, significance of properties in reactor design.
(T25, CN)

200-V. (German.) **Recent Developments in the Field of Steel Castings.** Werner A. Stauffer. *Giesserei,* v. 43, no. 18, Aug. 30, 1956, p. 508-519.

Reviews production, properties and applications of unalloyed, low-alloy and high-alloy steel castings.
(E general, CI)

201-V. (German.) **Copper as a Raw Material in High-Vacuum Technology. I.** W. Espe. *Nachrichtentechnik,* v. 6, no. 8, Aug. 1956, p. 355-364.

The chemical and physical properties of pure copper. Uses in vacuum condensers, X-ray tube anticathodes, wave guides, sealing caps and rings and glass-metal joints, use in rods, sheets and wires, uses of cast pure copper.
(T general, Cu)

202-V. (Italian.) **Principal Corrective Elements of Cast Iron and Steel; Their Influence and Use. Vanadium.** *Fonderia,* v. 5, no. 8, Aug. 1956, p. 425, 427, 429, 431.

Effects of vanadium, zinc, zirconium and sulphur on steel and cast iron.
(CI, ST, V, Zn, Zr, Ci)

203-V. (Book.) **Ingot Brass and Bronze.** Sections individually paged. 1956. Brass and Bronze Ingot Institute, 308 West Washington Street, Chicago 6, Ill.

Up-to-date, authentic information regarding specifications, physical characteristics, uses, and suggestions as to techniques by which these alloys can be successfully and economically utilized. (Cu)

204-V. (Book.) **Rem-Cru Titanium Manual.** Sections individually paged. 1956. Rem-Cru Titanium Inc., Midland, Pa.

Physical and mechanical properties; hot working; forming; grinding; machining; welding; heat treating; descaling; testing; corrosion resistance, metallography, chemical analysis; grades; shapes and sizes. (Ti)

205-V. (Book—German.) **Iron and Steel.** Heinz Gramm. 165 p. 1955. Fachbuchverlag, Leipzig.

Fundamentals of metallography. Properties of metals, steel production and manufacturing standards. Types of steel. Cast steel and gray iron. Cutting metals. (ST, CI)

206-V. (Book.) **Physical Metallurgy and Heat Treatment of Titanium Alloys.** Richard J. McClintick, G. William Bauer, and Lee S. Busch. 60 p. 1955. Mallory-Sharon Titanium Corp., Niles, Ohio.

Covers both metallurgical theories and practical heat treatments for annealing and hardening. Typical mechanical properties which can be expected of commercial titanium alloys in various heat treated conditions are included.
(J general, Q general, Ti)

207-V. (Book—German.) **Magnesium Handbook.** Georg Schichtel. 484 p. 1954. VEB Verlag Technik, East Berlin, Germany.

Magnesium technology from raw materials to surface protection. (Mg)

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A zirconium-molybdenum-tin alloy was heat treated to 168,500-psi. tensile strength and 153,500-psi. yield strength, with 11.5% elongation in 1 in. Transformations that occurred on aging various alloys are represented by equations. (Sn, Mo, Zr)

209-V. Structural Stability of Modified 12-Chromium Alloys. W. C. Hagel and E. F. Becht. *ASME, Transactions,* v. 78, Oct. 1956, p. 1439-1446.

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(Q general, Cr)

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Presents the engineer with basic data for intelligent design, in regard to engineering properties, design considerations, heat treatment, finishing and joining, applications.
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211-V. Materials Engineering File Facts. Cobalt and Cobalt Alloys. F. R. Morral. *Materials & Methods,* v. 44, Oct. 1956, p. 141.

Materials data sheet includes percentages of composition, physical and mechanical properties, thermal treatment, fabricating properties, corrosion resistance. (Co)

212-V. Molybdenum: Open for Business. *Steel,* v. 139, Oct. 22, 1956, p. 80-82.

Development of molybdenum as a high-temperature resisting metal, including present and potential uses.
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Contains 225 annotated references to unclassified reports. (Zr)

214-V. Production of Uranium From Ore to Metal. Alex Stewart. Paper from "Uranium and the Atomic Industry", no. 11, Atomic Industrial Forum, Inc., p. 31-44.

Various features of uranium and fabrication, processing, and the interrelationships of each phase. (U)

215-V. (German.) **Origin of Nonmetallic Impurities in Aluminum, and Their Effect on Further Processing.** H. Schmitt and H. Wittner. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 9, no. 9, Sept. 1956, p. 417-421.

Origin of aluminum oxide, carbon, phosphorus, sulphur, nitrogen, sodium, potassium and hydrogen. Effect in processing. Problem of blowhole formation. Effect of vacuum treatment. (Al)

216-V. Past, Present, and Future of High Temperature Nickel Base Alloys. F. L. VerSnyder. *Journal of Metals,* v. 8, sec. 1, Oct. 1956, p. 1445-1449.

Chemical composition, melting, casting and processing, mechanical properties, alloying and structure, special manufacturing problems. (Ni)

217-V. Metallurgy of Titanium. Marion G. Mastin. *Ordnance,* v. 41, Nov.-Dec. 1956, p. 432-435.

Production procedures and problems, reasons for high cost. (Ti)

218-V. Rem-Cru C-120AV. *Rem-Cru Titanium Data Sheet,* 1956, Sept. 1956, 11 p.

Alloy design, applications and available standard forms of alloy. Includes physical properties, creep, stability, notch stress rupture, impact, corrosion resistance, forging, annealing, welding and machining. (Ti)

219-V. Problems Associated With the Production and Use of Wrought Aluminium Alloys. G. Forrest and K. Gunn. *Royal Aeronautical Society, Journal,* v. 60, Oct. 1956, p. 635-658.

High-temperature treatment at several processing stages is discussed in addition to remelting, alloying, casting, mechanical working and mechanical properties. (Al)

220-V. Zirconium and Zirconium Alloys. E. F. Eiswerth. *Steel Horizons, (Technical Horizons),* v. 18, 4th quarter, 1956, 5 p.

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Compositions and mechanical qualities of several steels. (AY)

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A report on experimental meltings of heat resistant stainless steels with small amounts of alloying elements intended to secure sufficiently high heat resistant properties together with a practically ferrite-free structure. (SS)

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strength members, elements of sections, tolerances and commercial sizes of aluminum alloy products, conversion tables and other useful data, specifications. (Al)

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Handbook for metallurgists and students. Deals with structure, effect of inclusions and alloying elements, effect of gases, mechanical, physical and chemical properties, types of cast steels. (CI)

230-V. (Book—Spanish.) **Tungsten as an Alloying Element in Structural Steels.** Pedro Gomez Baeza. 121 p. 1953. Langa Y Cia, Tahona de las Descalzas, 6 Madrid, Spain.

Behavior of tungsten in structural steels, its influence on the transformations, temperability and properties of steels with 0.36% carbon. Studies of manganese-tungsten and aluminum-chromium-tungsten steels. Effect of boron in manganese-chromium-tungsten steels. Practical applications. (AY, W)

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SUBJECT INDEX

Since the annotations in the text are classified on the basis of properties and processes, the emphasis in the subject index has been placed on materials, products, and applications. Whenever possible, items have been indexed under the name of the material or product involved; entries under names of processes and properties refer only to general treatments of the subject without reference to specific materials or products. For example, references on the extrusion of aluminum have been indexed under the main entry "Aluminum alloys", and not under the main entry "Extrusion". In general, cross-references have not been made from property and process headings to materials and products. The user wanting all articles on a property or process without regard to the material should turn to the proper section in the book rather than to the index.

Alloy systems in which one member is predominant have been indexed under that member only. Where two or more members are equally predominant, entries have been made under each member. The subheading "systems" under the names of elements has been used for phase diagrams, constitution studies, and similar material; in these cases, entries have been made under the name of each element involved.

The main headings have been subdivided as the number of entries and the specificity of the material itself seemed to warrant. Where the user finds undivided headings, he should remember that the letter designation for each item indicates the general subject matter and thus serves in an indexing capacity.

In general, nomenclature conforms to the usage in the "ASM-SLA Metallurgical Literature Classification", published by the American Society for Metals, 1950.

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